



# NAVAL POSTGRADUATE SCHOOL

MONTEREY, CALIFORNIA

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## MBA PROFESSIONAL REPORT

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**An Examination of the United States Air Force  
Proposed Lease of Refueling Tankers**

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**By: Daniel L. Furber, and  
Harry Jaeger  
June 2004**

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<b>REPORT DOCUMENTATION PAGE</b>			Form Approved OMB No. 0704-0188	
Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instruction, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188) Washington DC 20503.				
<b>1. AGENCY USE ONLY (Leave blank)</b>		<b>2. REPORT DATE</b> June 2004	<b>3. REPORT TYPE AND DATES COVERED</b> MBA Professional Report	
<b>4. TITLE AND SUBTITLE:</b> An Examination of the United States Air Force Proposed Lease of Refueling Tankers			<b>5. FUNDING NUMBERS</b>	
<b>6. AUTHOR(S)</b> Daniel L. Furber and Harry Jaeger				
<b>7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)</b> Naval Postgraduate School Monterey, CA 93943-5000			<b>8. PERFORMING ORGANIZATION REPORT NUMBER</b>	
<b>9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES)</b> N/A			<b>10. SPONSORING / MONITORING AGENCY REPORT NUMBER</b>	
<b>11. SUPPLEMENTARY NOTES</b> The views expressed in this report are those of the author(s) and do not reflect the official policy or position of the Department of Defense or the U.S. Government.				
<b>12a. DISTRIBUTION / AVAILABILITY STATEMENT</b> Distribution Statement (mix case letters)			<b>12b. DISTRIBUTION CODE</b>	
<b>13. ABSTRACT (maximum 200 words)</b>  This project analyzes the proposed United States Air Force "acquisition" of 100 KC-767A tankers to replace KC-135E Statotankers. The Air Force intended to use an operating lease to obtain the services of these KC-767As in a timely manner and begin recapitalization of the aging aerial refueling fleet. There are three major research questions driving this project. First, in terms of national security, mission, and readiness, is there an immediate need for the Air Force to replace the KC-135? Second, if there is a need to replace the KC-135, is the KC-767A the best aircraft to satisfy the Air Force's long-term objectives? Finally, using the proposed lease of 100 aircraft, as the Air Force suggested, is leasing the best financial alternative to replace the KC-135? To answer these questions an examination of the KC-135 history, history of the proposed lease, comparison of alternative aircraft and solutions, stakeholder analysis, comparison of operating and capital leases, cost analysis, acquisition process, and other issues are presented. The examination concludes that the Air Force's proposed solution using the KC-767 aircraft and the operating lease method is not the best available.				
<b>14. SUBJECT TERMS</b> KC-767, Tanker, Leasing, KC-135, KC-10, KC-X, Omega Air, Special Purpose Entity, Private Financing Initiative, Acquisition, Boeing, Refueling, Air Force			<b>15. NUMBER OF PAGES</b> 109	
			<b>16. PRICE CODE</b>	
<b>17. SECURITY CLASSIFICATION OF REPORT</b> Unclassified	<b>18. SECURITY CLASSIFICATION OF THIS PAGE</b> Unclassified	<b>19. SECURITY CLASSIFICATION OF ABSTRACT</b> Unclassified	<b>20. LIMITATION OF ABSTRACT</b> UL	

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**AN EXAMINATION OF THE UNITED STATES AIR FORCE PROPOSED  
LEASE OF REFUELING TANKERS**

Major Daniel Lewis Furber  
and  
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Submitted in partial fulfillment of the requirements for the degree of

**MASTER OF BUSINESS ADMINISTRATION**

from the

**NAVAL POSTGRADUATE SCHOOL  
June 2004**

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# **AN EXAMINATION OF THE UNITED STATES AIR FORCE PROPOSED LEASE OF REFUELING TANKERS**

## **ABSTRACT**

This project analyzes the proposed United States Air Force “acquisition” of 100 KC-767A tankers to replace KC-135E Statotankers. The Air Force intended to use an operating lease to obtain the services of these KC-767As in a timely manner and begin recapitalization of the aging aerial refueling fleet. There are three major research questions driving this project. First, in terms of national security, mission, and readiness, is there an immediate need for the Air Force to replace the KC-135? Second, if there is a need to replace the KC-135, is the KC-767A the best aircraft to satisfy the Air Force’s long-term objectives? Finally, using the proposed lease of 100 aircraft, as the Air Force suggested, is leasing the best financial alternative to replace the KC-135? To answer these questions an examination of the KC-135 history, history of the proposed lease, comparison of alternative aircraft and solutions, stakeholder analysis, comparison of operating and capital leases, cost analysis, acquisition process, and other issues are presented. The examination concludes that the Air Force’s proposed solution using the KC-767 aircraft and the operating lease method is not the best available.

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## **I. INTRODUCTION**

The U.S. Air Force and Boeing have recently made headlines regarding the proposed lease of Boeing 767-200ER commercial aircraft. Among the headlines are alleged ethical misconduct on the part of Boeing and ex-governmental officials, public congressional support and opposition, allegations regarding a “Boeing Bailout,” controversy regarding costs of the proposal, and possibly one of the most complex defense contracts ever written.

Through the lease process, the Air Force will receive aircraft quicker and for less up-front dollars than the normal acquisition process. However, the backend and total costs are reported to be much higher than a normal purchase. The original proposed lease was to consist of 100 aircraft over a ten-year-period and included reconfiguring these commercial aircraft into the military tanker version KC-767A and \$1.7 billion in infrastructure upgrades. Not included was the cost to convert the aircraft back to the original commercial variation when the lease expires, a requirement of the leasing terms if the planes are not purchased by the Air Force at the end of the lease term.

The KC-135 tanker fleet has an average age of 42 years and has a diminishing operational readiness rate of approximately two and-a-half percent per year. Of the 604 total refueling aircraft in the Air Force fleet, 545 are KC-135s. Of those, 134 are KC-135E models, which the B767-200ER will replace. Of interesting note, the Boeing Company is already building and marketing the KC-767A.

During the past decade, the Boeing Company’s major competitor in commercial aviation, Airbus (a subsidiary of European Aeronautic Defence and Space Company), has steadily increased its market share for commercial aircraft sales. Boeing once dominated the commercial market by capturing 60 percent of total sales. Airbus now has over fifty percent market share.

In one segment of the commercial aircraft market, the Boeing 767 competes head on with the Airbus 330. The Airbus 330 has become the aircraft of choice by the airlines and orders for the Boeing 767 have been on the decline. The economics of decreasing

orders caused Boeing to find alternative uses for the 767 airframe, or close its production line. Boeing designed the KC-767A and received eight orders for these aircraft, four each from Japan and Italy. However, Boeing needed more than eight orders to keep the production line running.

In February 2001, the Boeing Company approached the U.S. Air Force with an unsolicited proposal to provide thirty-six KC-767A aircraft under the terms of a capital lease for \$124.6 million each. The Air Force, who had once deemed that the KC-135 tanker fleet would fly for another forty years, saw an opportunity to obtain new KC-767A tankers to replace the aging and problematic KC-135Es.

The Air Force's position on these aging aircraft dramatically changed after the events of September 11, 2001. After 9-11 it became a priority to replace the airframe due to fears of unforeseen safety issues potentially grounding over ninety percent of the air-to-air refueling capability of the U.S. Air Force.

Authorization for the Air Force to pursue the lease was inserted into the Fiscal Year 2002 (FY02) appropriations bill. While it was in conference, Chairman of the Senate Appropriation Committee Senator Ted Stevens (R-AK) (also chairman of the Senate Defense Appropriation Sub-committee) inserted into Title VIII, General Provisions, of the FY02 Department of Defense (DoD) Appropriations Act authorization to "lease not more than a total of 100 Boeing 767 aircraft and four Boeing 737 aircraft for the purposes specified herein."<sup>1</sup>

Later dubbed the "Virgin Appropriation," the wording was meticulous in order to conform to the Office of Management and Budget's (OMB) definition of an operating lease. This allowed the Air Force to obtain the "services" of planes while bypassing formal acquisition channels.

The initial proposed costs for the lease were in the range of \$120-150 million per aircraft. Other associated costs for infrastructure and support requirements ranged from \$1.7 to \$2 billion to improve aprons and taxiways, as well as new hangers for these larger

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<sup>1</sup> United States. Congress. Public Law. Public Law 107-7, Section 8159 (2002, Jan 10).

aircraft. Finally, at the end of the lease period approximately \$40 million per aircraft would be required by Boeing to convert them back into commercial aircraft.

On December 7, 2001, Senator John McCain (R-AZ) wrote to President George W. Bush regarding the FY02 Defense Appropriations Bill. He criticized the \$3.7 Billion in “Pork Barrel Projects” and specifically identified the last minute attached legislative provision for the Boeing 767 lease. He described it as a “Sweet Deal” for the Boeing Company. This was just the start of the Senator’s attacks on the proposed lease of the 100 Boeing 767s.

In April of 2002 the General Accounting Office (GAO) received a formal request by Senators McCain, Carl Levin (D-MI) and John Warner (R-VA) to evaluate the proposed lease. The May 15, 2002, response to the request can best be summarized as:

1) The GAO found the urgency for the short-term need was unclear, although there is a long-term requirement.

2) As the legislation requires the lease shall not exceed 10 years, a long-term shortfall would exist – the USAF will have to replace the 100 Boeing 767s aircraft at the end of the lease.

3) The cost effectiveness could not be determined as the USAF was still in the process of negotiating the terms. However, other less costly options exist such as upgrading the existing KC-135s.

4) Because the Boeing 767 is larger than the existing KC-135s, infrastructure upgrades will be required to support the operation of this new aircraft.<sup>2</sup>

Another issue coming to light was the appearance of improprieties on the part of Boeing and Air Force officials. Ms. Darleen Druyun, the top Air Force Acquisition Executive, had been working on the 767 lease deal. However, during this process Ms. Druyun had contacted Boeing’s Chief Financial Officer, Michael Sears, and met with him in October 2002 regarding employment opportunities. She subsequently recused herself

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<sup>2</sup> United States. GAO (2002, May 15), Letter to Senator John McCain, Publication Number GAO-02-724R, Air Force Tanker Leasing, 3.

from the 767 lease proceedings approximately two weeks later on November 5, 2002, just prior to her retirement from the federal government in December 2002.

More questions were raised about ethical conduct, improper acquisition procedures, and a general lack of defined requirements for a new tanker. Statements by industry experts were made regarding the cost at the end of the lease – general consensus was it is cheaper to purchase the aircraft at the end of the lease vs pay the conversion costs and then re-acquire new tankers to replace the leased aircraft.

The unrelenting scrutiny of the proposed lease raised the ire of congressional members. Many also believe the lease would result in the outright purchase of these aircraft. Due to these concerns, the Senate Armed Services Committee made changes. The proposal went forth leasing only twenty 767s and buying eighty.

However, Defense Secretary Donald Rumsfeld has put a hold on the entire project pending further investigations. Currently, the DoD Inspector General has been ordered by the Secretary of Defense to review the entire acquisition – including possible ethical violations by Boeing and Air Force officials. Boeing fired Sears and Drury on November 25, 2003, and the Chief Executive Officer Phil Condit resigned six days later.

## **A. RESEARCH QUESTIONS**

While there are many ways this story could be examined we will focus on two major areas – acquisitions and financial management. Specifically we will address the following issues for this MBA project:

1) In terms of national security, mission, and readiness, is there a need for the U.S. Air Force to replace the KC-135?

2) If there is a need to replace the KC-135, is the KC-767A the best aircraft or may other alternatives better fulfill the national security, mission, and readiness requirements of the USAF?

3) Finally, using the proposed lease of 100 aircraft, as the Air Force suggested, is leasing the best financing alternative to replace the KC-135?

## **B. RESEARCH METHODS**

Various sources were used in collecting the required information for this project. Numerous print media outlets and websites were accessed for information. Legislation regarding the proposed lease, as well as reports to congress from the Government Accounting Office (GAO), Congressional Budget Office (CBO) and Congressional Research Service (CRS) were also sources. Some interviews were conducted with and reports obtained from Senate staffers who wish to remain anonymous.

When possible, personal interviews or email exchanges were conducted with various individuals associated with the tanker community or Air Force acquisitions. An effort was made to obtain all pertinent acquisition instructions from DoD and the Commander Joint Chiefs of Staff (CJCS).

Technical specifics of the aircraft, including capabilities and aging/corrosion information, were gathered from open sources including Boeing and RAND Corporation studies.

## **C. ORGANIZATION OF THE REMAINING CHAPTERS**

In Chapter II, an examination of the history of the KC-135 will be conducted along with a review of the key events in the history of this tanker system, as well as, the proposed lease/acquisition of the KC-767. A review of the current systems, KC-135 and KC-10, will highlight the capabilities of each. Additionally, the capabilities of the KC-767 as proposed by the Boeing Company will be shown and compared to the system that it is due to replace/augment, the KC-135.

Chapter III will review the possible alternatives to replace and augment the KC-135. A comparison between the KC-10 and KC-135 will demonstrate the differences between the two current Air Force refuelers. Additionally, the concept tanker aircraft and other possible solutions will be presented.

In Chapter IV a stakeholder analysis will be conducted using five main parties: Boeing, Boeing Sub-contractors, Congress, the Whitehouse, and the U.S. Air Force. This will demonstrate the influences and external pressures that exist on an acquisition program.

The fifth chapter will analyze of the administrative aspects of an acquisition. It will compare the operating and capital lease mechanisms; doing so in accordance with the requirements set forth by the GAO for an operating lease. A cost analysis will compare the operating lease to an outright purchase. Next the special trust entity and types of bonds will show how the financing of the proposed lease is supposed to work. Finally, in this chapter, an outline of the acquisition process, requirement generation process and acquisition framework will be examined.

Finally, chapter six is a discussion of Air Force issues as well as a summary of the project, recommendations and conclusions, and direction for future research.

## **II. HISTORY OF THE KC-135 AND THE PROPOSED LEASE OF B767-200ER**

### **A. HISTORY AND EXAMINATION OF THE KC-135**

Developed out of a cold war requirement to provide air-to-air refueling for strategic bombers, the KC-135 has successfully accomplished its mission since 1957. The KC-135 is based on the Boeing Company's model 367-80 prototype, which eventually became the Boeing 707 commercial airliner.<sup>3</sup> With a wingspan of 130 feet, a fuselage length of 136 feet, and a height of approximately 38 feet, the KC-135 is slightly smaller than its commercial jetliner cousin. However, like the B-707, the KC-135 is powered by four turbofan engines.

There are currently three models of the KC-135 in the Air Force's inventory: KC-135E, KC-135R, and KC-135T. The two major differences between these three variants are: 1) The KC-135E has older and refurbished Pratt and Whitney TF33 turbofan engines while the KC-135R and KC-135T have newer International CFM CFM56 turbofan engines; and 2) The only difference between the KC-135R and KC-135T is a separation between the aircraft fuel tanks and transfer fuel tanks on the "T" model.<sup>4</sup>

The KC-135E has a maximum takeoff weight of 299,000 pounds while 322,500 pounds is the restriction for the KC-135 R&T. The aircraft has a maximum fuel transfer load between 200,000 and 202,800 pounds of fuel (equivalent to 29,850 to 30,268 gallons)<sup>5</sup> which depends upon individual aircraft <sup>6</sup>, and maximum cargo and passenger capacity of 83,000 pounds (maximum of 50 passengers).<sup>7</sup> Overall, the KC-135 has a

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<sup>3</sup> The first B-707 commercial jetliner was delivered to Pan-Am Airways in 1958.

<sup>4</sup> The KC-135T is the upgraded KC-135Q which was designed to specifically service the retired SR-71 Blackbird. The SR-71 used a special fuel that turbofan engines cannot use. Other than a separation in the fuel system the KC-135R and KC-135T are identical.

<sup>5</sup> These numbers were extrapolated by dividing the maximum transfer load weight by 6.7 pounds per gallon of JP-8.

<sup>6</sup> Due to length of production (1954-1965) the aircraft got lighter as technological improvements were made. The numbers shown reflect "R" model capabilities.

<sup>7</sup> The average aircraft empty weight is 119,231 pounds. The combination of the fuel, cargo and aircraft empty weight can not exceed the maximum takeoff weight of 322,500 pounds.

service ceiling of 50,000 feet, can cruise at 530 nautical miles per hour (mach .802) at 30,000 feet, and has a range of 9,732 nautical miles with 120,000 pounds of transfer fuel on-board. The refueling transfer capabilities of the KC-135 are based on the flying boom (Figure 1). All KC-135s are equipped with this flying boom allowing a maximum fuel flow rate of 1,084 gallons (6,500 pounds) per minute. Forty-five of the 411 KC-135R models also have a wingtip hose and drogue system which allows two aircraft to re-fuel simultaneously (Figure 2). The flow rate of the drogue system is approximately 470 gallons (2,820 pounds) per minute.

Regardless of the model, the KC-135 is capable of refueling any U.S. aircraft equipped for air-to-air refueling operations. However, if not equipped with the wingtip drogue system, the boom must be fitted with a special tow drogue in order to refuel probe-equipped aircraft. This “fitting” can only be installed on the ground and takes 6-12 man-hours to accomplish. Once configured with the tow drogue, the aircraft cannot refuel receptacle receiver aircraft until the drogue is removed. This must be removed on the ground. All re-fuel capable helicopters and most of the U.S. Navy and Marine Corps fixed wing aircraft, as well as most allied aircraft, are probe-equipped.



FIGURE 1. KC-135R REFUELING A F-15 WITH THE FLYING BOOM  
(From: *The Boeing Company Website*, March 2004)



FIGURE 2. KC-135R REFUELING TWO F-14S WITH THE HOSE AND DROGUE SYSTEM

*(From: The Boeing Company Website, March 2004)*

The airframe has been a workhorse for the U.S. military. It has served in 37 different configurations such as the VC-137 (VIP transport), E-3 Airborne Early Warning and Control System (AWACS), E-6 Submarine Communications Platform, E-8 Military Battlefield Reconnaissance Platform, EC-135C Strategic Command Post, RC-135 Special Reconnaissance, OC-135 Command Post, and other variants. The KC-135 has gone through three major retrofits or upgrades in its almost fifty year service life.

These upgrades include a major re-skinning of the wings along with new engine struts, installing new engines, and updating avionics. In 1988, the 13-year program to re-skin the underside of the KC-135 wings was completed. This re-skinning consisted of replacing 1,500 square feet of aluminum and replacing the engine mounts. This work required approximately 564 new parts, 32,200 steel fasteners, and 19,500 rivets.<sup>8</sup> The engine upgrade replaced the original engines with CFM-56 engines on 411 KC-135As, subsequently re-designated KC-135Rs. Additionally re-furbished Pratt and Whitney JT3D, re-designated TF33 by the USAF, turbofans taken from retired Boeing 707 commercial airliners were used to upgrade the remaining KC-135s, now “E” models. The avionics of the KC-135s have been upgraded and managed with a “block approach” or incrementally. The most current upgrade is the Block-40 giving the KC-135 a Global

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<sup>8</sup> The Boeing Company, KC-135 Stratotanker Web Site. Retrieved April 4, 2004, from <http://www.boeing.com/defense-space/military/kc135-strat/flash.html>

Air Traffic Management (GATM) system.<sup>9</sup> Other major improvements were the introduction of Global Position System (GPS), modernized cockpits that are otherwise known as “glass” or “digital” cockpits, enhanced ground proximity warning system,<sup>10</sup> Reduced Vertical Separation Minima (RVSM)<sup>11</sup>, and a navigation and safety modification<sup>12</sup>. The RVSM, enhanced ground proximity warning system, and the navigation and safety modification mentioned before, were all part of the Block-30 upgrade.

Note a critical point in the history of the KC-135: Only one major grounding in its almost 50-year history. In 2000, one-third (198 aircraft)<sup>13</sup> of the KC-135 fleet was grounded due to a faulty replacement part installed nearly a year earlier in the stabilization trim system of these KC-135s. There has been no other major grounding of the KC-135. The only other problem has been the constant fight against corrosion, which has been ongoing for nearly 30 years.

The cost of a new KC-135 at the beginning of the program was \$39.6 million in 1998 constant dollars. The cost for upgrading the A models to R models was approximately \$22 million each and to upgrade to the E model was about \$1 million each. Additional cost to upgrade the E model is estimated at \$40 million. Overall, the aircraft has been spoken of as “irreplaceable” by the staff at the U.S. Air Force’s Tanker Requirements Branch. “There is no economical way to go to Boeing and have them build us a new one” says LTC Lester Preston, Chief, Tanker Requirements Branch.<sup>14</sup>

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9 GATM allows air traffic controllers to deconfliction, track and communicate directly with aircraft that are on oceanic flights. Elizabeth Starrett (2003 June). Cross Talk - The Journal of Defense Software Engineering, Upgrading Global Traffic Management. Retrieved February 27, 2004 from <http://www.stsc.hill.af.mil/crosstalk/2003/06/starrett.pdf>

10 This uses aircraft position and a digital terrain database to provide “look-ahead” awareness to the aircrew.

11 This equips the fleet to operate in reduced vertical separation airspace. This includes an additional digital air data computer, new digital altimeters and digital airspeed indicators.

12 Flight data recorder, cockpit voice recorder and emergency locator transmitter.

13 Associated Press (2000, February 29). *Air Force grounds nearly 200 planes over safety question*. Retrieved on February 5, 2004, from <http://www.cnn.com/2000/US/02/29/air.force.grounding.02/>

14 Personal communication with LTC Lester Preston, Chief of Tanker Requirements Branch, Scott AFB, Illinois, on March 12, 2004.

## **B. CHRONOLOGICAL EVENTS: 1954 - PRESENT**

Below is a list of the major events in the 50-year history of the KC-135 fleet and the proposed lease of the Boeing 767 aircraft.

August 1954 – The United States Air Force (USAF) orders limited production quantities of the KC-135 after the first flight of the Model 367-80 prototype.

August 1956 - First test flight of a KC-135 by the Boeing Company.

1957 - The USAF accepts its first KC-135 from the Boeing Company.

1962 - First full-scale fatigue test performed by the USAF results in wing failure at 55,000 simulated flight hours. USAF sets a “safe life” for the wings of 13,000 hours.

1965 - Boeing delivers the last KC-135 to the USAF.

1972 - Second full-scale fatigue test performed by the USAF results in wing failure at 43,200 simulated flight hours.

1975 - The lower wing re-skinning program starts. It replaces 1,500 square feet of wing skin aluminum, engine mounts, and thousands of parts.

1977 – A blue ribbon panel is formed to investigate the fatigue issue and wide-spread fatigue damage (WFD) found in the 1972 study. The panel finds that WFD develops around the 8,000-9,000 flight hour mark. The panel recommends imposing flight restrictions on KC-135s with 8,500 accumulated hours until they complete the re-skin modification.

1977 – The Air Force initiates a durability and damage tolerance assessment (DADTA). Findings show with proper modifications and inspections the KC-135 would last beyond 2040.

1981 – The Air Force starts the engine upgrade program. The Air National Guard and USAF Reserve aircraft receive refurbished Pratt and Whitney TF33 engines while the active component will receive new CFM International CFM-56 engines.

1988 - The lower wing re-skinning program is complete.

1995 – The Air Force starts “Coral Reach” – a KC-135 sustainment master plan to reduce costs and improve aircraft availability.

6 August 1996 - GAO Report on U.S. Combat Power, Aging Refueling Aircraft Are Costly to Maintain and Operate, cites “the long term serviceability of the KC-135 tanker fleet is questionable,” and it will cost over “\$6 Billion in modifications and structural

repairs to keep the KC-135 fleet operational.” Additionally, the report recommends procuring dual-purpose aircraft to replace the KC-135. The Office of the Under Secretary of Defense responds “with proper maintenance and upgrades, we believe the aircraft may be sustainable for another 35 years.”

1996 – A blue ribbon panel examines the “Coral Reach” program and finds there will not be an onset of WFD in the fuselage, empennage, or previously modified lower wing till after 2040.

1997 – National Materials Advisory Board issues its final report on Aging of USAF Aircraft. This report recommends action that “replaces these lower wing surfaces and the station 733 joint closure rib that has had a lot of problems with corrosion and stress corrosion cracking (SCC).”<sup>15</sup>

February 1999 – The RAND Corporation publishes its Aging Aircraft Study – The study finds the KC-135 Program Depot Maintenance (PDM) costs will rise dramatically in the second decade of the next century due to the “increasing age of the cargo and tanker fleets.”

2000 – The Air Force Posture Statement by the Secretary of the Air Force identifies the KC-135, as well as other strategic aircraft as needing “aggressive modernization” and funding these requirements “will help ensure there are no gaps in our global mobility in the 21<sup>st</sup> Century.”<sup>16</sup>

20 February 2000 – One third of the KC-135 fleet is grounded. The cause of the grounding is a faulty replacement Stab-Actuator nut used in minor upgrade.

June 2000 – GAO Report on Military Readiness, Air Transport Capability Falls Short of Requirements, cites a KC-135 mission capable rate of 67 percent for the period of 1997-1999. This would have resulted in shortage of 85 KC-135s (15.8 million pounds of fuel/day) to support two major theaters of war had the scenario arose.

February 2001 – The USAF conducts an Economic Service Life Study (ESLS). The findings of this study included: “significant cost increases” between 2001 and 2040, but “no economic crisis is on the horizon”, “there appears to be no run-away cost-growth,” and “the fleet is structurally viable to 2040.”<sup>17</sup>

February 2001 – The Boeing Company approaches the USAF regarding a capital lease of 36 Boeing KC-767s.

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<sup>15</sup> The 733 joint is just outside of the outboard engine on each wing.

<sup>16</sup> United States. Air Force. *United States Air Force, Posture Statement 2000* (2000) Page 11. Retrieved February 5, 2004, from <http://www.af.mil/library/posture/posture2000.pdf>

<sup>17</sup> United States. Congressional Research Service – Library of Congress. CRS Report RL32056 (2003, September 2), *The Air Force KC-767 Tanker Lease Proposal: Key Issues For Congress*, 2. Washington, D.C 20540-7000.

September 11, 2001 – The United States is attacked by terrorists. For the first time in U.S. history, E-3 AWACS fly missions over the Continental United States resulting in a dramatic increase in re-fueling requirements for the KC-135.

December 2001 – Representative Norm Dicks (D-WA) inserts Section 8159 into the 2002 Defense Appropriations Bill which states “lease not more than a total of 100 Boeing 767 aircraft and 4 Boeing 737 aircraft for the purposes specified herein.”

10 January 2002 – The Defense Appropriations Act is passed and becomes Public Law 107-117. Congress approves the negotiations for the lease of 100 B 767 aircraft.<sup>18</sup>

18 May 2002 - Senators Murray (D-WA) and John McCain (R-AZ) “duke it out” over the proposed USAF lease of B 767s.<sup>19</sup>

23 May 2002– The DoD announced that it approved an agreement under which the AF will lease 100 B 767s through the year 2017 – as approved by Congress in Section 8159 of the FY2002 appropriations act.<sup>20</sup>

29 May 2002 - Senator Murray (Appropriations Committee) touts the Boeing lease as a “good deal for the tax payer and the Air Force”.<sup>21</sup>

20 June 2002 – Citizens Against Government Waste express outrage over the announcement by Boeing that it will pursue more lease deals similar to the Air Force B 767 lease.<sup>22</sup> The article cites three congressional supporters: House Speaker Dennis Hastert (R-IL), Rep. Todd Tiahrt (R-KA), and Senator Murray – all have constituents employed by Boeing.<sup>23</sup>

14 July 2002 – AF Submits a report to Congress on the lease as required by Section 8159 of PL 107-117 and requests approval of the four congressional defense committees to reprogram funds to cover initial costs of the lease. Three of the four approve the lease

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18 United States. Congressional Research Service – Library of Congress (2003, December 9), *Authorization and Appropriations for FY2004: Defense*, 45. Washington, D.C 20540-7000.

19 Eric Miller, The Seattle Post-Intelligencer (2002, May 29). *Boeing Tankers: Murray Likes Plan for Which There is no Need*, B5.

20 United States. Congressional Research Service – Library of Congress (2003, December 9), *Authorization and Appropriations for FY2004: Defense*, 45.

21 Miller, *Boeing Tankers: Murray Likes Plan for Which There is no Need*, B5.

22 Citizens Against Government Waste, PR Newswire Association, Inc. (2003, June 20). “Bad Business at the Department of Defense.”

23 The B 767-200ER the USAF is poised to acquire is being designated as the B 767-200C. This new designation reflects upgraded avionics, fuselage cargo doors, and 120 KVA power supply.

programming. The Senate Armed Services Committee (SASC) did not approve the program pending the outcome of hearings on the proposal.<sup>24</sup>

23 May 2003 – The Secretary of the Air Force (SECAF) approves the USAF to enter into a multi-year pilot program for leasing general purpose B 767 aircraft under the authority of Section 8159 of the DoDAA 2002.<sup>25</sup>

10 July 2003 – The SECAF notifies Congress of the intent to lease 100 B 767 aerial refueling tankers.<sup>26</sup>

11 July 2003 – The USAF provides the Defense Committees and the Appropriations Committees a new-start notification associated with the proposed lease of 100 KC-767.<sup>27</sup>

25 July 2003 – House Armed Services Committee (HASC) Chairman Duncan Hunter (R-CA) believes the \$17 Billion lease will lead to an outright buy at the end of the lease. Marvin Sambur (USAF Acquisition Chief) states a Multi-Year Procurement (MYP) would add \$11 billion to the FYDP causing the service to accept cuts in other programs. This article cites a GAO report that questions the urgency of the of the Air Force's need to replace the KC-135s and the fact the USAF has long accepted the risk of the KC-135 comprising 90 percent of the refueling fleet.<sup>28</sup>

26 August 2003 – CBO report says leasing the tankers would cost \$1.3 Billion to \$2 Billion more than purchasing the aircraft.<sup>29</sup>

3 September 2003 – Senator McCain blasts Congress for failing to thoroughly investigate the USAF's plan to lease the B 767s. McCain suggests that AF officials colluded with Boeing to secure the deal.

4 September 2003 – The DoD launches investigation into the Boeing tanker Lease.<sup>30</sup>

Circa 14 September 2003 – The President of the United States (POTUS) announces support of the Air Force proposal to lease 100 B 767 tanker aircraft.<sup>31</sup>

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24 United States. Congressional Research Service – Library of Congress (2003, December 9), *Authorization and Appropriations for FY2004: Defense*, 46.

25 Air Force Tanker Lease (2003, July 23). Federal Document Clearing House Congressional Testimony, *Federal Document Clearing House Inc.*

26 Ibid

27 Ibid

28 Lorenzo Cortes, (2003). HASC Chairman Sees 767 Tanker Deal As Leading to Acquisition, *Defense Daily International*, 3-28.

29 Nick Jonson, (2003). McCain Blasts Congress, USAF over Boeing 767 Tanker Lease, *Aerospace Daily*, 207-46, 1

30 Sharon Weinberger, (2003). IG Launches Investigation into Boeing Tanker Lease, *Defense Daily*, 219-46

22 October 2003 – Chairman of the SASC Senator John Warner (R-VA) discusses alternative plan with Senator McCain for leasing less than 25 and purchasing more than 75 Boeing 767s to replace that KC-135Es.<sup>32</sup>

7 November 2003 – House passes FY 2004 DoD Authorization Bill (362 to 40). This bill includes the compromised 767 deal as proposed by Senator Warner and agreed to by DoD (purchase 80, lease 20).

12 November 2003 – Senate passes FY 2004 DoD Authorization Bill (95 to 3) with this compromise.

24 November 2003 – POTUS signs the DoD Budget into law for 2004 – includes first 20 as lease and 80 as purchase.

25 November 2003 – Boeing fires CFO Mike Sears and Vice President of Missile Defense Systems Darleen Druyun. Druyun is the former USAF Acquisition Chief who stated negotiations on the original lease deal.

28 November 2003 – Senator McCain and Senator Fitzgerald (R-IL) write to the Secretary of Defense (SECDEF) – stating it would be irresponsible for the department to go ahead without a full review into whether the Boeing executives, who were fired for alleged unethical behavior, improperly affected negotiations.<sup>33</sup>

1 December 2003 – Boeing CEO Phil Condit resigns to “remove any cloud over the tanker contract.”<sup>34</sup>

1 December 2003 – Deputy Defense Secretary Paul Wolfowitz writes a letter stating “In light of the recent allegations and actions taken within the Boeing Company to remove Michael Sears and Darleen Druyun, I am ordering a pause in the execution of the contracts to lease and purchase tanker aircraft.”

3 December 2003 – Pentagon puts Boeing deal on hold pending the investigation of allegations leading to the firing of two Boeing officials.

4 February 2004 – Senator McCain challenges the Secretary of Defense’s (SECDEF), Donald Rumsfeld, handling of the investigation into the Boeing Lease deal at SASC hearing on the FY 2005 defense budget. <sup>35</sup>

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31 Staff (2003, September 22) Jobs or Defense? Boeing Fuel Tanker Lease Bad Deal for Taxpayers, *The Houston Chronicle*, A-18

32 Sharon Weinberger, (2003). Warner Proposes Reduced Tanker Lease to McCain, *Defense Daily*, 219-16

33 Helen Jung, (2003, November 29). *Two Senators Want 767 Deal Postponed*. Retrieved March 1, 2004 from <http://web.lexis-nexis.com>

34 Philip Dine, (2003, December 3). Pentagon Puts Boeing Tanker Deal on Hold/Defense Department Will Investigate Allegations That Led to Firings of Two, *St. Louis Post-Dispatch*, p.A1.

6 February 2004 - The SECDEF announces the DoD will wait for reports from the Defense Policy and Science Board, the National Defense University, the DoD IG and the general counsel before proceeding with the controversial plan. The reports are due in May 2004.<sup>36</sup>

24 February 2004 – Defense Acquisition Chief Michael Wynne sends letter to the SASC Chairman, Senator Warner and Ranking Member, Senator Carl Levin (D-MI) stating the Air Force will study a variety of options for replacing the aging KC-135 fleet.<sup>37</sup> This Analysis of Alternatives (AOA) is required for the POTUS wartime supplemental FY 2004 spending package.

### C. KC-135 AND KC-10 UTILIZATION

The Air Force has two aircraft that make up its heavy-lift refueling fleet, the KC-135 and the KC-10. The KC-10 is based on the DC-10 airframe and is therefore much newer. The fifty-nine KC-10s in active service were bought through out the 1980's, with the last being delivered in 1988. Each airframe will be examined in its performance in recent years and the most recent period of high demand, Operation Iraqi Freedom.

One of the major metrics used to determine the health and potential mission accomplishment viability of aircraft is the operational rate, also known as the Mission Capable Rate (MCR). The MCR is a basic equation that divides the number of aircraft capable of performing their mission by the total number of aircraft available.<sup>38</sup> The USAF has established a mandate of 85 percent MCR for all aircraft. The five-year average (1997-2002) MCR for the KC-135Rs was roughly 78 percent while the KC-135 overall average was 71.9 percent for the same period.<sup>39</sup> In 1999, 32 percent of the KC-

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<sup>35</sup> Kathy Gambrell, (2004). Tanker Deal on Ice Until May Pending Outcome of Reviews, *Aerospace Daily*, 209-23, 3

<sup>36</sup> Ibid

<sup>37</sup> Amy Klamper, (2004, February 27). *Air Force Finally Plans to Study Options for Replacing Tankers*. Referenced March 1, 2004 from <http://www.govexec.com>

<sup>38</sup> According to CRS Report RL32056, page 15, "The MCR is only calculated for those aircraft not otherwise unavailable due to depot maintenance or training requirements."

<sup>39</sup> Major General Paul W. Essex, Director, Plans and Programs, HQ Air Mobility Command. "U.S. Representative Duncan Hunter Holds Hearing on Air Force Tanker Lease Program." July 23, 2003 FDCH Political Transcripts, Washington, DC.

135 fleet was unavailable due to programmed depot maintenance (PDM). The Air Force Mobility Command was directed to “fix the problem.”<sup>40</sup>

As a result of the “fix,” it is estimated “KC-135s are spending 45 percent less time in depots than they were two years ago and 100 more aircraft are now available to the warfighter than in July 2000.”<sup>41</sup> These estimates probably account for the most current operational readiness rates for the KC-135s in Operation Iraqi Freedom (OIF). See Table 1.

AIRCRAFT TYPE	Aircraft involved in the operation	Operational Readiness Rate
KC-135	149	86.4%
KC-10	33	81.7%

TABLE 1. OPERATION IRAQI FREEDOM KC-135 AND KC-10 OPERATIONAL RATES

*(From: Operation Iraqi Freedom, By the Numbers, USAF, April 2003)*

In the recent past there was a depot maintenance backlog at KC-135 maintenance centers<sup>42</sup>. The backlog issue received direct attention from then USAF Chief of Staff (CoS) General Michael Ryan, who directed the facility to “fix the problem.” The fix consisted of reconstructing the maintenance line so one aircraft would not cause a bottleneck in the depot maintenance system. While it is unclear if this fix has directly increased utilization, certain reserve units, such as the 940<sup>th</sup> Air Refueling Wing at Beale Air Force Base, have been directed to turn in their E models to the “bone yard” at Davis-Monthan Air Force Base.<sup>43</sup> In turn these units will receive active duty R model aircraft. The justification is greater availability of aircraft as a result of infrastructural changes at

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40 United States. Congressional Research Service – Library of Congress. CRS Report RL32056 (September 2, 2003), *The Air Force KC-767 Tanker Lease Proposal: Key Issues For Congress*, 15. Washington, D.C 20540-7000.

41 Ibid

42 These facilities are Tinker Air Force Base, OK and the Boeing Aerospace Support Center in San Antonio, TX.

43 Personal communication with Major Robert Couse-Baker, Chief of Public Affairs 940th Air Refueling Wing, Beal AFB, California, on April 2, 2004.

the maintenance facilities (it is anticipated these aircraft will fly more due to the higher throughput levels at the depot maintenance facility). Additionally, it has been recognized that there is a certain number of KC-135E model aircraft that, due to structural changes, are economically unfeasible to upgrade.<sup>44</sup>

**D. EXAMINATION OF THE PROPOSED CAPABILITIES OF THE CONVERTED B 767-200ER (KC-767A) AS COMPARED TO THE OPERATIONAL REQUIREMENTS DOCUMENT (ORD)**

The Chief of Staff of the Air Force, General John P. Jumper, signed the Operational Requirements Document (ORD) for the Air Refueling Aircraft Program (AMC 004-01-B) on 22 October 2002. The document is 125 pages of specific capabilities for the follow-on to the KC-135 aircraft. Capabilities that must be met are called thresholds. Other capabilities that are not required but that would enhance performance are included as well and are called objectives. The ORD covers all aspects of operating a tanker aircraft, from flight performance, to safety and maintenance, to refueling capabilities.

Requirements documents identify the critical performance requirements by identifying the Key Performance Parameters (KPPs). In essence, KPPs are the performance criteria the system must meet otherwise the users will not accept it. Surprisingly, there are relatively few KPPs for even the most complex systems. However, Program Managers (PM) cannot trade these requirements to reduce risk. In addition to the KPPs, there are other important performance parameters that the PM must strive to meet.<sup>45</sup> Table 2 shows the KPPs for the air refueling system.

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<sup>44</sup> The differences are due to engineering changes that normally occur because of technological and process improvements over the duration of long term programs.

<sup>45</sup> Defense Acquisitions University, (2002). *What are Key Parameter Control Boards?* Retrieved April 7, 2004 from [http://acc.dau.mil/simplify/ev.php?ID=3324\\_201&ID2=DO\\_TOPIC](http://acc.dau.mil/simplify/ev.php?ID=3324_201&ID2=DO_TOPIC).

Key Performance Parameter	Threshold	Objective
Fuel Offload versus Range Para 4.1.2.1	See Figure 4	See Figure 4
Tanker Air Refueling Para 4.1.2.1	The aircraft must be able to use (non-simultaneously) both boom and drogue AR systems, day or night, on the same flight	
Boom Air Refueling Para 4.1.2.1.1	Capable of boom AR with all RCM* identified receiver aircraft using current procedures and airspeeds with no receiver modifications and no restrictions due to lighting/shadows	
Drogue Air Refueling Para 4.1.2.1.2	Capable of drogue AR with all RCM identified receiver aircraft using current procedures and airspeeds with no receive modifications	
Receiver Air refueling Para 4.1.2.1.2	Capable of day and night receiver AR from KC-10, KC-135, or this aircraft using current AR procedures	
Global Air traffic Management Para 4.1.2.2	Worldwide flight operations	
Interoperability	100% of top-level IERs designated critical will be satisfied	100% of top-level IERs will be satisfied

TABLE 2. KPP SUMMARY OF ORD AMC-001-01-B  
(From: Taken from the USAF Tanker Program Operational Requirements Document, October 2002)

The KC-767, as it is to be produced for the USAF, will meet all of the KPPs. The only threshold in the document wording not met by the KC-767 is the ability to refuel two drogue-equipped aircraft simultaneously (See Figure 3). This threshold is addressed specifically in the Requirements Correlation Matrix (RCM). The RCM is a table, numbering over thirty-five pages, which identifies each system capability or characteristic parameter, its thresholds, objectives, threshold justifications and spiral.

Spirals are defined in the Air Refueling Aircraft Program ORD, AMC-001-01-B, as:

Spiral 1 – Denotes requirements that absolutely must be on the first leased aircraft.  
Spiral 2 – Denotes requirements the command would be willing to defer until later deliveries under the lease.

Spiral 3 – Denotes current growth path requirements and other modifications that would probably not be until after the AF negotiates a purchase for the aircraft following the lease term.



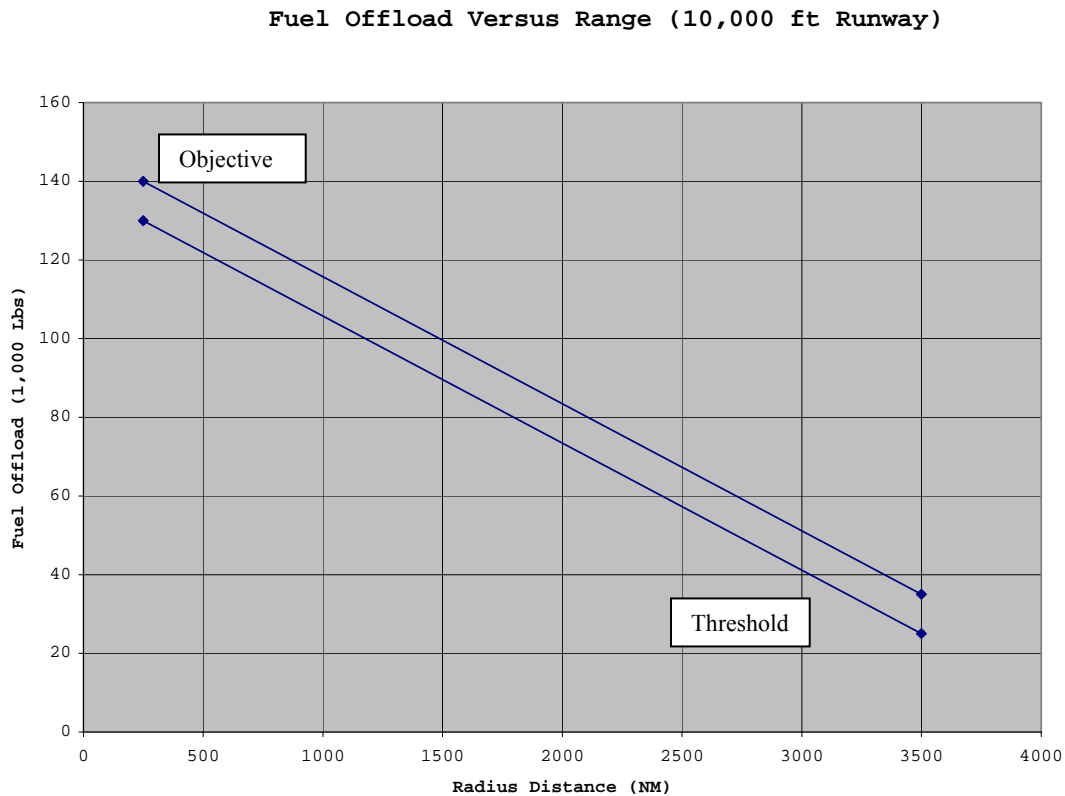
FIGURE 3. BOEING’S RENDITION OF THE KC-767A WITH WING-TIP RE-FUEL PODS  
(From: *The Boeing Company Website*, March 2004)

The capability to simultaneously refuel two probe-equipped aircraft is listed as a Spiral 2 requirement. Interestingly, when questioned about this capability, Boeing president and CEO Jim Albaugh said “We could do it in the first spiral, if that’s what they required, but they have not asked for that.”<sup>46</sup>

The question that remains after looking at the ORD and capabilities is whether or not the KC-767, while meeting the KPPs, is the best aircraft available? Is replacing the KC-135 with, in refueling terms, a marginally more capable system the best choice?

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<sup>46</sup> Amy Klamper, (2004, April 6). Boeing Official Predicts Tanker Deal To Be Completed in '04, *National Journal's Congress Daily*.



**FIGURE 4. FUEL OFFLOAD REQUIREMENT OBJECTIVE VS. THRESHOLD**  
*(From: The USAF Tanker Program Operational Requirements Document, October 2002)*

#### **E. COMPARISON OF KC-135 AND KC-767A**

The most basic comparison is of the two airframes themselves. The KC-767A is based upon the Boeing 767C which itself is a variation of the 767-200ER. Compared to the KC-135 the 767C has a wingspan 26' wider at 156', length 23' more at 159' and its height is 52', making it just over 10' taller, than the KC-135.

The empty weight of a KC-135 is approximately 119,230 pounds. The maximum takeoff weight of the KC-135E is 299,000. This limitation is regardless of KC-135E

configuration. The maximum fuel off-load is approximately 160,000 pounds which is 20% less (40,000 pounds) than the KC-135R.<sup>47</sup>

The empty weight of a 767-200ER is 182,900 pounds.<sup>48</sup> The empty weight of the KC-767 will be near 200,000 pounds. The KC-767 weighs more due to the additional equipment and upgrades required to convert the airframe into a tanker. The maximum takeoff weight of the KC-767 is 395,000 pounds.<sup>49</sup> While the KC-767 is capable of offloading 20% more fuel than the KC-135E, it “will have roughly the same maximum fuel offload as the KC-135R.”<sup>50</sup> The Air Force views the fact the KC-767 can itself be aerially refueled as an important capability.

The KC-767 is capable of refueling either receptacle or probe equipped aircraft on every mission. There is an internal hose-and-drogue system in the underside of the aircraft. There are also plans to equip the KC-767 with wingtip tanks to allow simultaneous refueling of multiple probe-equipped aircraft as mentioned in section A of this chapter. See in Figure 1, 2, & 3.

The KC-767 is equipped with two engines as opposed to the four-engined KC-135. The KC-767s ordered by Italy and Japan are powered by the General Electric CF6-80C2 engine - rated at 62,100 pounds of thrust. These high thrust engines allow the KC-767, while heavier, to operate from runways only 8,000 feet long. This decreases the runway length requirement by 4,000 feet. Thus, the number of runways available to the Air Force world wide for a tanker, operating at maximum weight, increases from 288 to 8,000.<sup>51</sup> The USAF will also be offered the Pratt & Whitney PW4062, rated at 63,300

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47 Computed using: United States. Air Force. Air Mobility Command. Public Affairs Office (2003). *U.S. Air Force Fact Sheet: KC-135 Stratotanker*. Scott AFB, IL 62225-5335.

48 Boeing 767-200ER performance data. Retrieved 16 April, 2004 from [www.boeing.com](http://www.boeing.com)

49 P. De La Garza, (2003, June 14). MacDill Lands 32 New Tankers. *St. Petersburg Times*. Retrieved April 28, 2004 from [http://www.sptimes.com/2003/06/14/Tampabay/MacDill\\_lands\\_32\\_new\\_.html](http://www.sptimes.com/2003/06/14/Tampabay/MacDill_lands_32_new_.html)

50 United States. Congress. House Armed Services Committee (2003, July 23). *Statement by Dr Marvin Sambur Assistant Secretary of the Air Force (Acquisitions)*. Retrieved April 28, 2004 from <http://www.house.gov/hasc/openingstatementsandpressreleases/108thcongress/03-07-23sambur.html>.

51 United States. Congressional Research Service – Library of Congress. CRS Report RL32056 (September 2, 2003), *The Air Force KC-767 Tanker Lease Proposal: Key Issues For Congress*, 23. Washington, D.C 20540-7000.

pounds of thrust, slightly more than the GE engine. The prices of both engines vary greatly. Depending upon the quantities purchased and associated support or service contract the price could be narrowed down between \$3,000,000 and \$10,000,000 per engine.

The flight characteristics of the KC-135 were discussed earlier in this chapter (See Section II A). The characteristics of the KC-767 are slightly better. Normal cruising altitude is around 38,000 ft and cruising speed is 530 mph (.80 mach). Operating two engines allows the KC-767 to burn less fuel during missions.

The Boeing 767-400ER fuel consumption is approximately 1954 gallons/hour using the PW4062 engine. While the B 767-400ER is larger (45,000 pounds) than the 200ER model that the KC-767 is based on, it is assumed that the fuel consumption for the KC-767 will be less than the 1,954 gallons/hour.<sup>52</sup> The KC-135R has a fuel flow rate of approximately 2,500 gallons/hour.<sup>53</sup> The result is that the KC-767 should burn (at least) 506 gallons/hour less than the KC-135. The current rate for JP-8 per gallon ranges from \$0.91/gallon to \$0.95/gallon, so this is a negligible operating price differential per hour.<sup>54</sup> However, when looking at total ownership costs per airframe and an approximate life of 40,000 flight hours, the total cost savings could result in a \$20,000,000 savings in today's dollars.

Both the KC-135 and KC-767 are equipped to carry cargo, passengers, or operate in an Aeromedical role. The KC-135 has a limitation of fifty passengers or six pallets at 36,000 pounds total. The KC-767 is capable of carrying 200 passengers or nineteen pallets with a limitation of 77,000 pounds. In the Aeromedical role the KC-135 can hold 24 patients while the KC-767 can hold 108, almost a five-fold increase. A KC-767 operating in the Aeromedical role benefits from a shorter runway.

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<sup>52</sup> B 767-400 vs. A 330-200, *The Commercial Aircraft*. Retrieved on May 7, 2004 at <http://www.geocities.com/CapeCanaveral/Lab/8803/f764332.htm>. The data listed on the web site is in Kg/Hr. The data was converted to gallons/hour for use in this project.

<sup>53</sup> United Kingdom. Ministry of Defence. *Royal Air Force. ATP-56A: The NATO Air-to-Air Refueling Document. Annex 10Q, National Annex – United States of America*, 10Q-1 (May 2003).

<sup>54</sup> AT&L Knowledge Sharing System, Ask a Professor – Question and Answer Detail. Retrieved on May 8, 2004 from <http://akss.dau.mil/askaprof-akss/normal/qdetail2.asp?cgiSubjectAreaID=2&cgiQuestionID=10137>.

The Air Force originally wanted the KC-767 to be able to carry passengers and cargo simultaneously, known as a “combi”. The Japanese and Italian KC-767s are combis. To have the combi capability would have added to the cost for the USAF, and the requirement was dropped.<sup>55</sup> However, just having the additional heavy lift capacity will allow the Air Force more flexibility in moving cargo, especially due to the fact the KC-767 can operate from shorter runways.

The driving issue behind the need to replace the KC-135Es is corrosion and the resultant increased maintenance cost. Having a newer airframe will significantly reduce those costs. This will also allow for greater aircraft availability. Table 3 shows projected aircraft availability.

The KC-135E can be expected to be unavailable for 870 days of the 2,190 in the six-year period. This equates to only 60% availability. The KC-767, for the same six-year period, is projected to experience only 174 days of down time resulting in a 92% availability rate for that period. However, as the KC-767 airframe gets older, it will probably not retain this availability rate past this six-year period.

	KC-135E*	KC-135R*	KC-767**
Scheduled Depot	325	288	48
Unscheduled Depot	19	19	31
Mods	62	62	0
Flight Line Maint.	464	346	95
Total Not Available	870	715	174
Bottom Line	60%	67%	92%

**TABLE 3. PROJECTED AIRCRAFT AVAILABILITY**

(Days not available to the warfighter in a 6-year period per aircraft)<sup>56</sup>

(From: CRS Report for Congress, The Air Force KC-767 Tanker Lease Proposal, September 2003)

\*Based on actual data extended over 6-year operational time frame

\*\*Based on FY12 fleet projections extended over a 6-year period

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<sup>55</sup> United States. Congressional Research Service – Library of Congress. CRS Report RL32056 (September 2, 2003), *The Air Force KC-767 Tanker Lease Proposal: Key Issues For Congress*, 24. Washington, D.C 20540-7000.

<sup>56</sup> Ibid, 23

In summary, the KC-767, while significantly more capable than the KC-135E it is to replace, is not a leap in refueling capability as would be expected for an airframe forty years newer. But the KC-767 can access 2,777 percent more runways throughout the world and can be re-fueled in flight. This gives Air Mobility Command (AMC) greater flexibility in planning and staging re-fuelers to support operations. It also gives AMC more ability to influence contingencies such as air-medivac and emergency re-fuel missions. Additionally, the KC-767 burns about 500 gallons less per hour than the KC-135 giving it a slight edge in hourly operating costs, that over time amounts to substantial savings. However, in terms of the primary objective of delivering more fuel, there is a negligible difference between the KC-767 and KC-135R for fuel offload capability. If the Air Force wants a new tanker, why not seek an alternative with significantly more fuel offload capacity? A larger aircraft with a larger offload capacity would allow for demand to be met with fewer airframes and sorties flown, and presumably less total costs.

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### III. ANALYSIS OF ALTERNATIVES

#### A. KC-10 VS. KC-135

In order to better understand the current capabilities of the USAF tanker fleet, a comparison of the two most prominent platforms will be presented. In total there are just over 600 KC-135s and KC-10s in the Air Force inventory. As mentioned earlier, the KC-767 and KC-135 have comparable off-load capabilities. Since the KC-767 and KC-135R have comparable off-load capabilities, this comparison will also better illustrate how the KC-767 will stack up against the most recent tanker procured by the Air Force, the KC-10.

Through the 1980's the Air Force purchased sixty KC-10 tankers. Today, fifty-nine of these are still a part of the Air Force tanker fleet. One was lost due to a ground fire in 1987. Based on the McDonnell Douglas DC-10 Series 30CF Convertible Freighter, the KC-10A Extender emerged victorious in a contest with Boeing's Model 747 aerial tanker variant to satisfy the U.S. Air Force's Advanced Tanker Cargo Aircraft requirement. McDonnell Douglas was subsequently bought by the Boeing Company, which now owns all of the rights to the DC-10 and flying boom of the KC-10A. In December 1977, it was selected by the USAF based on an integrated assessment of capability, price, life-cycle costs and technical features on the DC-10.<sup>57</sup>

In a side-by-side comparison of the KC-135 and the KC-10, the KC-10 outperforms the KC-135 in every facet of tanker operations. With a wingspan over 165 feet, almost 182 feet long and 58 feet tall, the KC-10 is considerably larger than the KC-135. Total fuel capacity of the KC-10 is 356,000 pounds – almost twice as much as KC-135.<sup>58</sup> Maximum gross takeoff weight is 590,000 pounds. Three GE CF6-50C2 turbofan engines producing 52,500 pounds of thrust each power the KC-10. At maximum takeoff

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<sup>57</sup> Retrieved 14 April, 2004 from <http://www.theaviationzone.com/factsheets/kc10.asp>

<sup>58</sup> United States. Air Force. Air Mobility Command. Public Affairs Office (2003). *U.S. Air Force Fact Sheet: KC-10 Extender*. Scott AFB, IL 62225-5335.

weight the KC-10 requires 10,400 feet of runway, considerably less than the 12,000 feet required by the lighter KC-135.

The KC-10 can be refueled in flight by another KC-10 or a KC-135, increasing its delivery range. The un-refueled range and offload capabilities of each aircraft are shown in Figure 5.

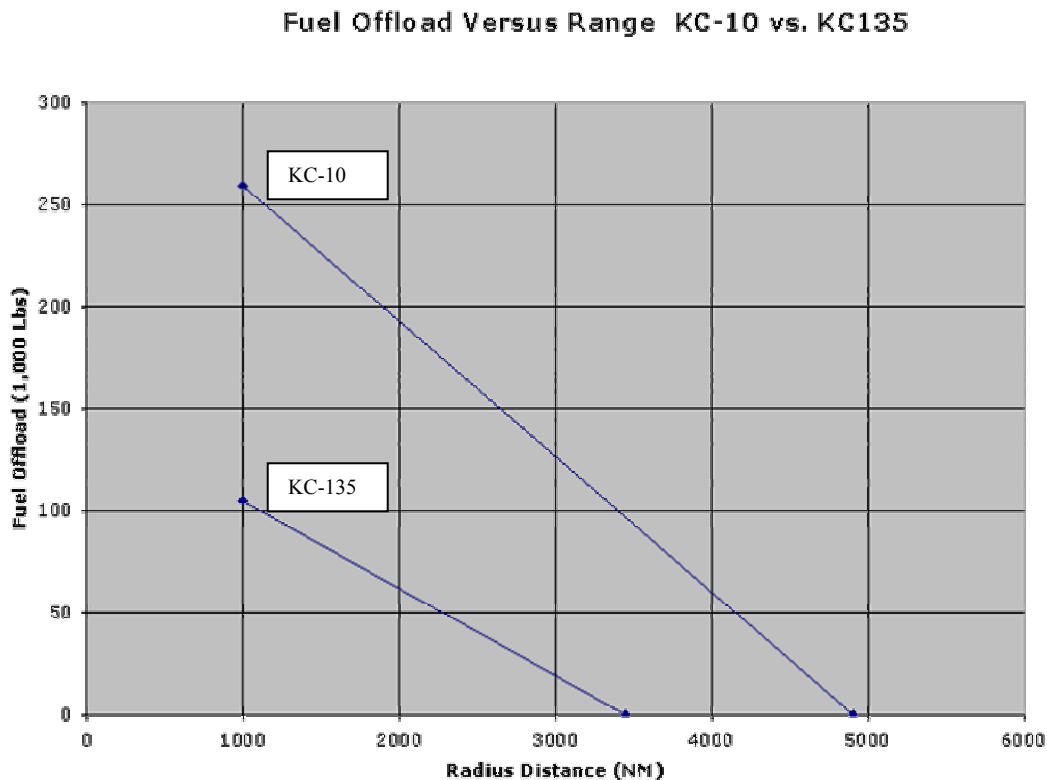


FIGURE 5. KC-10 VS. KC-135 FUEL OFFLOAD AND RANGE  
(From: *www.globalsecurity.org*, March 2004)

All KC-10s are equipped with an improved fly-by-wire boom for refueling operations as well as in internal hose and drogue system. This gives the KC-10 the capability to refuel either receptacle or probe type receivers on every mission. The KC-10 has the capability to change from one system to the other while in flight. Fifteen KC-10s are modified with the hose and drogue Wing Air-Refueling Pods (WARP) allowing simultaneous operations with two probe equipped aircraft.<sup>59</sup>

<sup>59</sup> Retrieved 14 April, 2004 from <http://www.theaviationzone.com/factsheets/kc10.asp>

Even though the KC-10's mission is aerial refueling, it can combine the tasks of a tanker and cargo aircraft by refueling fighters and simultaneously carry the fighter support personnel and equipment on overseas deployments. Without refueling, the KC-10 can transport up to 75 people and nearly 170,000 pounds of cargo a distance of about 4,400 miles. Without cargo the distance is 11,500 miles.<sup>60</sup>

The KC-10 is equipped with a large upward swinging cargo door, located on the left side of the forward fuselage. The cargo loading system is adapted from the commercial DC-10 freighter. The KC-10 system added powered rollers and a power winch system to aid in moving cargo forward and aft.

The KC-10 can accommodate various configurations with up to twenty-seven pallets of cargo or a combination of seventeen pallets and seventy-five passengers. The KC-135 can only haul six pallets, each with a 6,000 pound maximum, for a total maximum weight, including non-palletized cargo, of 38,000 pounds and cannot carry passengers. A rather amazing statistic is the KC-10 accounts for twelve percent of total USAF cargo capacity.<sup>61</sup>

## **B. KC-X AND OTHER ALTERNATIVES**

The Air Force has long known it will need a replacement aircraft for the KC-135 fleet. The replacement has been referred to as the KC-X Advanced Mobility Aircraft. The idea behind the KC-X concept is one airframe, with modular engineering, fulfilling many different roles.<sup>62</sup>

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<sup>60</sup> United States. Air Force. Air Mobility Command. Public Affairs Office (2003). *U.S. Air Force Fact Sheet: KC-135 Stratotanker*. Scott AFB, IL 62225-5335.

<sup>61</sup> United States. Congressional Research Service – Library of Congress. CRS Report RS20941 (July 24, 2003), *Air Force Aerial Refueling: Lease, Buy, or Other*. Washington, D.C 20540-7000.

<sup>62</sup> *KC-X Advanced Mobility Aircraft*. Retrieved on 18 April, 2004 from <http://www.globalsecurity.org/military/systems/aircraft/kc-x.htm> www.globalsecurity.org,

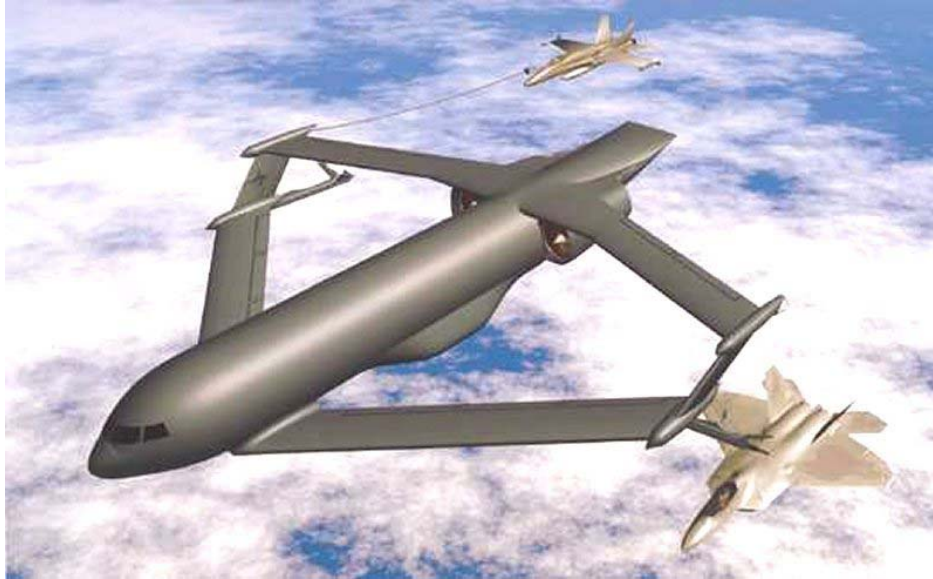


FIGURE 6. LOCKHEED MARTIN RENDITION OF THE KC-X  
(From: Lockheed Martin Company, April 2004)

The primary mission of the KC-X is refueling. The modular concept will allow a single airframe to meet the Air Mobility Command's (AMC) mission requirements of airlift, airdrop, and air-to-air refueling. The KC-X is what will result from the complete analysis of alternatives by the USAF.

Figure 6 shows the Lockheed Martin rendition of the KC-X. Their proposed design will have multiple boom and drogue refueling stations on the outside of the unique box-wing design. With no center-mounted boom, the airframe will be able to accommodate roll-on/roll-off handling of vehicles, equipment, and container cargo.<sup>63</sup>

An advanced aerial tanker design currently available is converting commercial DC-10s into KDC-10s. The Boeing Company currently offers the conversion service. Two DC-10-30 CFs have been converted into KDC-10s for the Royal Netherlands Air Force (see Figure 7).<sup>64</sup> While maintaining all of the capabilities of the KC-10, the KDC-10 incorporates next-generation tanker technology.

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<sup>63</sup> Lockheed Martin Homepage. Retrieved on April 19 2004 from [www.lmaeronautics.com/products/ada/adv\\_mobility](http://www.lmaeronautics.com/products/ada/adv_mobility)

<sup>64</sup> Retrieved February 22, 2004 from <http://www.globalsecurity.org/military/systems/aircraft/kdc-10.htm>



FIGURE 7. ROYAL NEHTERLANDS AIR FORCE KDC-10 CONVERTED BY BOEING  
*(From: [www.raf-cott.demon.co.uk/archeive/riat\\_2000.html](http://www.raf-cott.demon.co.uk/archeive/riat_2000.html), April 2004)*

The KDC-10 has a Remote Aerial Refueling Operation (RARO) system. The RARO has three dimensional operator displays and is controlled from the forward main deck of the aircraft. This is in contrast to the lower fuselage location with aft-looking window set-up of the KC-10 and KC-135 boom operator's station.

As part of the system, there are remote sensors allowing for a wing-tip-to-wing-tip look aft of the aircraft. This offers much greater visibility of receiver aircraft than the naked eye/window system of the KC-10 and KC-135. RARO also includes night-vision technology as well as improved poor weather visibility and enhanced depth perception.

Another example of the technology advancement is that the RARO's operator's consol is on a pallet. It can be removed for more space when operating in a cargo or passenger carrying role. The KDC-10 is also fitted to accept the WARP for refueling multiple probe-equipped aircraft.

What cannot be overlooked is the benefit of commonality with the commercial DC-10. Due to the commonality, there is a worldwide network of FAA-certified repair

facilities and easy access to common spare parts.<sup>65</sup> Boeing recently won the contract to service the RARO station of the KDC-10 for the Royal Netherlands Air Force.

The United Kingdom's Ministry of Defence (MOD) invited invitations to bid on its Future Strategic Tanker Aircraft (FSTA) program in 2000. There is a requirement to replace its current fleet of twenty-eight air-to-air refuelers; two consortia submitted formal bids in July 2001.

One was a consortia led by Boeing and BAE Systems. The other, a company formed specifically to bid on the FTSA, AirTanker Ltd, led by EADS, the parent company of Airbus, and Rolls-Royce.<sup>66</sup> Final bids were received from both consortia on 30 April 2003.

The UK Secretary of State for Defence announced on 26 January 2004 the bid from AirTanker Ltd was judged to offer the best prospective value for money using a Private Finance Initiative (PFI) solution to the FSTA requirement. And it was recently announced the Royal Australian Air Force also selected AirTanker as their choice as an air-to-air refueling platform.

According to the UK MOD web site, PFI is attractive because "A PFI arrangement would be a true partnership between the RAF and the private sector, working in the best spirit of Smart Acquisition. The RAF would continue to retain responsibility for all military tasks, whilst the contractor would own, manage and maintain the aircraft and also provide training facilities and some personnel."<sup>67</sup>

The AirTanker aircraft is based upon the Airbus 330-200 airframe powered by the Rolls-Royce Trent 772B engine. Total fuel capacity is 111 metric tons, almost 245,000 pounds. The aircraft will have no additional fuel tanks other than internal capacity. The AirTanker will maintain all of the A330 cargo and passenger capacity. As currently

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65 Retrieved 12 April, 2004 from <http://globalsecurity.org/military/systems/aircraft/kdc-10.htm>

66 Douglas Barry, (2004, February 1). EADS Led Team wins Tanker Battle, *Aviation Weeks and Space Technology*. Retrieved February 5, 2004 from [http://www.aviationnow.com/avnow/search/autosuggest.jsp?docid=43117&url=http%3A%2F%2Fwww.aviationnow.com%2Favnow%2Fnews%2Fchannel\\_awst\\_story.jsp%3Fview%3Dstory%26id%3Dnews%2F02024wna.xml](http://www.aviationnow.com/avnow/search/autosuggest.jsp?docid=43117&url=http%3A%2F%2Fwww.aviationnow.com%2Favnow%2Fnews%2Fchannel_awst_story.jsp%3Fview%3Dstory%26id%3Dnews%2F02024wna.xml)

67 United Kingdom. Ministry of Defence. Defence Procurement Agency. *Project Fact Files: Future Strategic Tanker*. Retrieved on April 20, 2004 from [www.mod.uk/dpa/projects/FSTA\\_Detail.htm](http://www.mod.uk/dpa/projects/FSTA_Detail.htm)

planned, the AirTanker will have only a hose and drogue system. It will be capable of refueling multiple aircraft simultaneously.

### **C. MULTI-USE VS. SINGLE USE MISSION AIRFRAMES**

There is no debate as to what the primary mission of the KC-135 replacement will be, tanking. However, there is the question as to whether or not it is an aircraft built specifically for that mission, such as the KC-767, or a multi-use airframe, such as the KC-10 or KC-X proposal. The multi-use airframe does bring significant advantages to the table.

A multi-use airframe allows the USAF more flexibility in operations. With an airframe capable of refueling aircraft enroute to an overseas deployment and carrying the support troops required, the combat aircraft is ready for missions almost upon arrival. This also frees other airlift aircraft, such as the C-5 and C-17, to be used for other missions. As a tanker is required in order for the deploying aircraft to reach its destination, having the ability to move significant amounts of cargo is a welcomed capability.

The KC-10, which can carry 170,000 pounds of cargo in addition to its fuel load does account for approximately twelve percent of DoD's organic airlift capability,<sup>68</sup> a very significant amount. In a time where funds are scarce, a platform capable of performing both missions, adding to the overall cargo capacity of DoD, seems to be a better choice.

The major problem with the KC-135 fleet is corrosion, which is a direct result of the age of the airframe, averaging over 42 years. A typical KC-135 flies around 300 hours a year. There are airline equivalents flying the same number of hours in a month.

The Air Force needs to have excess capacity, tankers, available to surge to meet the requirements of war and deployments. During OIF, the USAF allocated 149 KC-135s and 33 KC-10s to U.S. Central Command to prosecute the war that was fairly small

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<sup>68</sup> United States. Congressional Research Service – Library of Congress. CRS Report RS20941 (July 24, 2003), *Air Force Aerial Refueling: Lease, Buy, or Other?*, p. CRS-2. Washington, D.C 20540-7000.

in scope. This equates to 30 percent of the Air Force tanker fleet operating in one theater and under the operational control of one Combatant Commander (COCOM). The NMS directs the U.S. military be capable of fighting two nearly simultaneous regional conflicts. This could mean that another 30 percent of the tanker fleet could be deployed should the need arise. In addition to this, there has to be additional tanker capability available to support aircraft moving into and out of theater, other COCOMs and their missions, and CONUS based training and support operations. For these reasons, the Air Force must have excess capacity during peacetime.

For a commercial airline, if the asset is not being used, there is no revenue. As a consequence, Air Force assets are aging well ahead of their useful life in flying hours. Most KC-135s should have around 20,000 hours of flight-hour life remaining. Many of these hours may never be utilized if the aircraft must be retired prematurely due to corrosion. If adequate preventative measures are not in place, corrosion to the plane occurs regardless if its flying or sitting on the ground. A multi-use airframe with a higher utilization rate could help the Air Force, DoD, and industry. Utilizing fewer multi-use aircraft at a higher flight-hour rate would ensure the Air Force uses the engineered service life of the asset rather than waste the service life due to aging. This would also help industry by providing a more consistent demand for tanker/heavy-lift aircraft from the Air Force. Finally, it would alleviate the USAF problem of recapitalizing the entire fleet of 544 KC-135s within a few years.

#### **D.     OUTSOURCING POSSIBILITIES**

From July through September 2000, Omega Air, a private company headquartered in Dublin Ireland, tested its concept of a refurbished Boeing 707, fitted with a Sergeant Fletcher hose and drogue system internally, tanking U.S. Navy aircraft. The Sergeant Fletcher is the system currently in use by the U. S. Navy. The hose and drogue system is normally mounted externally. The testing was done at the Naval Air Warfare Center, Patuxent River, MD. It was a success and Omega has been leasing its refueling services to the Navy since.

Ulick McEvaddy is the director of Omega and conceived the idea of buying surplus aircraft and converting them to tankers. McEvaddy stated the 707 was chosen due to the fact that more than 500 of the aircraft are still flying world-wide and repair parts and facilities are easy to locate. He believed the continued pace of U.S. overseas deployments, and the UK's decision to use PFI for its follow on tanker, would lead to a niche market for private companies to provide leased tanker services.

This has turned out to be true. While Omega only offers services for probe-equipped aircraft, the U.S. Navy has been a consistent customer. The ease of scheduling the private firm has made them very attractive to Navy exercise and training planners. Not only is the scheduling easier, the Navy pays Omega \$5,500 per hour, compared to the \$11,000 per hour to use a KC-135, a fifty percent cost saving.<sup>69</sup>

While retrofitting some former commercial airliners has proven to be useful, it cannot cover all of the purported needs of the Air Force. Equipping an aircraft with a hose and drogue system is considerably easier than the rework required fitting an airframe with a boom. There are currently only two types of aircraft that can be reengineered into boom capable refuelers, the 767-200ER and the DC-10-30 CF, the cargo version of the DC-10.

The 767-200ER is the basic model for the KC-767. While there are also 767-300s and 400s, neither is compatible to be converted into a tanker due to fuselage length. The length of the later versions would not allow the aircraft to rotate for takeoff with the heavy loads of fuel. Boeing built fewer 200ERs due to the advantages of the later versions. The extended range and more seating capacity of the 300s and 400s made them more attractive to commercial airlines.

Very few 767s were put into storage by the airlines after 9-11 when excess passenger capacity became an issue because it is a newer, efficient airframe. There are only seven 767-200ERs not in service with the airlines. According to Michael Laucious with Boeing Capital Corporation not all seven would be compatible for refit. 200ERs

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<sup>69</sup> Sandra I. Erwin, (2000, October). Navy Considering Commercial Tanker Lease: Company contends it can refuel naval jets at half the cost of military tankers. *National Defense*. Retrieved March 2, 2004 from <http://www.nationaldefensemagazine.org/article.cfm?Id=296>[www.nationaldefensemagazine.org](http://www.nationaldefensemagazine.org)

built only for passenger duty do not have the required max take-off weight to be KC-767s.

While there are DC-10s mothballed, according to Laucious only twelve of the cargo variant are suitable for conversion. This airframe, the DC-10-30 CF, that can be converted due to the additional weight the airframe is designed to carry. One of the differences is additional landing gear mounted along the centerline of the fuselage. These additional wheels allow for greater weight distribution so that the heavy aircraft reduced the damage to airport runways or tarmac.

In a comprehensive analysis of alternatives, each of the options discussed in this chapter would be scrutinized and compared to the requirements. When deciding if the KC-767 and the lease option is the best alternative, whether or not there is an immediate need, and whether or not it is a need possibly superseding other programs are important factors. If there is a need to procure tankers in the very near future, and the lease is under agreeable terms for the government, perhaps it is a good choice as a stopgap in order to allow for the necessary time and resources. If more time is available to make a decision, it should be used to acquire a multi-use airframe, whether retrofitting existing airframes or the KC-X.

## IV. STAKEHOLDER ANALYSIS

*It is not from the benevolence of the butcher, the brewer, or the baker, that we expect our dinner, but from their regard to their own interest.*

*-Adam Smith, The Wealth of Nations*

The stakeholder analysis allows one to view the concerned parties and their interest in a decision. A stakeholder is defined as anyone that is affected by or can influence a decision to be made. This stakeholder analysis is important to ensure that we account for the social-political-economic forces that affect the decisions of the stakeholders. Since the KC-767 acquisition started with a congressional leader inserting Section 8159 into the 2002 Appropriations Bill while it is in conference, one can see that there are forces at work, other than the purely business aspect of acquiring the best valued product to meet the need. Clearly, this acquisition started with political interest and not with the standard Mission Need Statement that is the norm for DoD acquisitions. The decision to use, or not to use, the Boeing 767-200ER, or another Boeing product, as a tanker has considerable implications. These implications could affect more than just Boeing and their employees - Boeing sub-contracts most of the parts of their aircraft and Boeing is only one of two U.S. aircraft manufactures with the capability to produce large aircraft. Using a product other than the Boeing 767 means the production line will surely close. For purposes of this examination we will look specifically at the following stakeholders: Boeing and its subcontractors, the U.S. Air Force, the Department of Defense, Congress, and the White House. All of these stakeholders have a definite interest in the outcome of the acquisition of KC-767 aircraft. A methodology of interest in the deal, conflict with other parties, and relationship with other parties will be used to present these stakeholders.

## **A. THE BOEING COMPANY**

### **1. Interest in the Deal**

The Boeing Company arguably has the largest to lose or gain in the outcome of the Air Force's lease or buy decision of the KC-767A tankers. Boeing has received barely enough orders to keep the 767 production line open. If substantial quantities of these aircraft are not ordered soon, Boeing may have to close the production line. Production slowdowns and shutdowns mean layoffs. Boeing has already decreased its commercial aircraft workforce; from 96,200 employees in 2001 to its current 53,640.<sup>70</sup> The majority of these commercial aircraft employees are spread across six states; California, Kansas, Texas, Tennessee, Pennsylvania, and Washington (See Annex 1 for city locations and congressional representation).

Obviously, the Boeing Company is highly motivated to secure either a lease deal or sale of these Boeing 767 aircraft to increase its profit. Presumably, Boeing has already recovered its investment in 767 development and production facilities. Since the investment is considered sunk cost, additional planes sold or leased will enhance profits.

The Boeing Company does have some capability to affect the decision as it has strategically built its production and site management facilities throughout the nation – 25 different states. These locations give Boeing the representation of 60 House Representatives and 50 Senators. While a congressman cannot represent a company, they do represent its voting employees. With that being said, Boeing has the ear of more than the 60 Representatives by merely having a Boeing facility in their congressional district. Additionally, Boeing has contributed \$377,830 this year (2004) to a combination of 179 members of congress and congressional candidates in an attempt to influence the Congress (See Annex 2 for a list of campaigns that Boeing contributed to in 2004).

Boeing actually has two fronts on which to “maneuver” in attempting to gain political backing by congress. The first front is the common congressional lobbying which most businesses engage in. The second front is the Boeing employees petitioning

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<sup>70</sup> The Boeing Company. Retrieved on May 7, 2004 from [http://www.boeing.com/employment/employment\\_table.html](http://www.boeing.com/employment/employment_table.html).

their congressmen. Together, both of these fronts could have dramatic input into the lease decision of the KC-767As. A third, possibly less potent front, could come from Boeing's sub-contractors and their employees. This will be discussed in paragraph B below. Regardless, it is understood that most politics are driven by local issues. The ultimate concern of the politicians is to take care of their constituents or else suffer the consequences during the next election.

## **2. Conflict with Other Parties**

Certain parties are not amenable to the pending lease deal. The first group is best categorized as a group of groups or individuals believing that the lease deal is not in the best interest of the United States taxpayer. This group has such notable names as Senator John McCain, whose own constituents include the Boeing Company and its employees. A notable group within this opposition is the Project on Government Oversight (POGO) who

remains one of the most respected and unflappable watchdogs in Washington with its laser-like focus on complex issues of waste and abuse affecting the military, contractors and government spending.<sup>71</sup>

The other group is the competitor of the Boeing Company, Airbus of North America. Airbus would like nothing more than the Boeing Company losing the USAF deal, possibly allowing them to get the contract Airbus claims their "business with U.S. industry reached \$5.5 billion, supporting an estimated 120,000 American jobs at hundreds of companies in more than 40 states."<sup>72</sup> Airbus wishes to present to Congress that they are a contributor to the U.S. and local economies.

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<sup>71</sup> *The Project on Government Oversight*. Retrieved on April 30, 2004 from <http://www.pogo.org>.

<sup>72</sup> Airbus of North America. Retrieved on April 30, 2004 from <http://www.airbusnorthamerica.com/about/suppliers.asp>

### **3. Relationship with Other Stakeholders**

The Boeing Company has many other relationships that could have an impact on the outcome of the lease deal. Boeing has built a great relationship with the USAF and the DoD through the years of supplying equipment and services - Boeing was the second largest Defense Contractor in 1998 in total revenues - \$10,988,491 DoD wide and \$6,503,141 from Air Force contracts.<sup>73</sup> In 2002, these revenues totaled \$13,595,338 and \$6,997,394, respectively.<sup>74</sup>

Other relationships with the stakeholders have already been identified above except for the Whitehouse. The relationship with the Whitehouse is hard to determine – other than Boeing contributing \$5,000 to the Presidential Campaign for 2004, other ties have been hard to find.

## **B. BOEING SUB-CONTRACTORS**

### **1. Interest in the Deal**

The Boeing Company has approximately 83 different subcontractors with 42 of those operating in the United States.<sup>75</sup> Of the foreign companies that support Boeing operations most of them reside in countries whose governments are strong allies to the U.S such as the United Kingdom, Japan, Australia, and Canada. Regardless, these sub-contractors also have a stake in the outcome of the proposed lease or sale deal. The prospect of Boeing either gaining or losing the contract for the 767 tankers affects Boeing 767 subcontractors' bottom lines just as it affects Boeing itself – the subcontractors have the same motivations as the Boeing Company. While it is understood that the foreign sub-contractors have limited ability to exert pressure on the internal U.S. political process, they can incite pressure on their state departments to exert pressure on the U.S.

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<sup>73</sup> 100 Top Defense Contractors 1998. *GovExec.Com*. Retrieved May 1, 2004 from <http://www.govexec.com/top200/98charts/98dod.htm>

<sup>74</sup> 100 Top Defense Contractors FY 2001. *GovExec.Com*, 15 August 2002. Retrieved May 1, 2004 from <http://www.govexec.com/top200/02top/s3chart1.htm>

<sup>75</sup> The Boeing Company. Boeing 767 Commercial Aircraft Suppliers. Retrieved on May 7, 2003 from <http://www.boeing.com/commercial/767family/background.html>. The information contained was extrapolated for this report.

Department of State. The U.S. based companies, however, will use the same process as Boeing to lobby Congress for a successful lease or purchase deal.

## **2. Conflict with Other Parties**

Like their interest in the deal, the pool of sub-contractors that help build the 767 face the same opposition parties, though, not as pronounced or publicized. While the opposition groups publicize a ‘bail out for Boeing,’ and a perception that the lease deal is a bad business deal for the U.S. Government, they do not address these 42 companies that are exerting pressure on Congress to spend the money on the 767. Additionally, these opposition groups are not addressing the 40 foreign contractors that could be exerting pressure at the state department level of government.

## **3. Relationship with Other Stakeholders**

Close ties with the Boeing Company, their congressional representatives, and their employees can be used to shape the political battlefield of the Boeing Tanker lease.

# **C. THE UNITED STATES AIR FORCE**

## **1. Interest in the Deal**

The United States Air Force states they need to replace their KC-135 tanker fleet. The Boeing 767 is currently being built and sold as a tanker so Boeing has the type of product that the USAF wants. Additionally, the Boeing Company, in conjunction with Northrop-Grumman and Raytheon, is developing the E-10A Multi-Sensor Command and Control Aircraft (MC2A) for the USAF which is utilizing the Boeing 767-400ER airframe. A pre-system development and demonstration contract was awarded on 14 May 2003. If the system enters the production and deployment phase of the acquisition, the Government could experience a dramatic and un-forecasted rise in E-10A overhead costs.

The other important interest the USAF and the United States leadership have regarding national security is the preservation of the U.S. aerospace industrial base. Since the defense drawdown in the early 1990’s and numerous consolidations Boeing and

Lockheed are the only aerospace companies capable of producing large aircraft. Boeing's aircraft business has been on the downturn. They have been losing market share in the tightening commercial aircraft industry. This has caused Boeing to expand their Defense Contractor focus. Lockheed has not produced a commercial aircraft since the L-1011 production stopped in 1983. Currently Lockheed-Martin is only producing the C-130J Hercules and the C-27J Spartan for both the commercial and military markets.

Overall, the USAF is possibly in the strongest position to make the deal happen, since the legislation has already been approved.

## **2. Conflict with Other Parties**

Due to the mounting opposition, the USAF is being forced to defend itself and its decision to lease the 100 KC-767 tankers. This deal affects the reputation of the service and its civilian and military leaders. Since there are also implications of wrong doing on the part of USAF senior acquisition executives, the Air Force is further defending its decision to lease these aircraft. Accordingly, the Air Force will defend their position as a matter to protect their reputation. In general, the USAF is in opposition with the same parties that have been previously listed as apposing the deal.

Another party that all services find themselves at odds with is Congress. Traditionally, there has been a power struggle regarding the budget of the services, which Congress controls. Historically, all the services have circumvented the budgetary rules placed upon them by Congress. It is these rules, as well as the associated definitions, that are at the heart of the issue with the KC-767 lease. However, most of the 'open' opposition within the Congress is coming from just a few members.

## **3. Relationship with Other Stakeholders**

As stated earlier in Section A of this chapter, the USAF has an existing relationship with the Boeing Company. Additionally, the USAF has a good relationship with some of Boeing's subcontractors. Some of Boeing's 'subs' are themselves prime contractors for other systems or services that the Air Force is using. Additionally, as

stated above in the previous paragraph, the USAF has an interesting relationship with Congress. The Congress controls the procurements of the USAF by approving the procurement and funding for those procurements. Finally, The Air Force is subordinate to the Whitehouse. As a member of the executive branch, the President and his appointed SECDEF, have the final authority over all USAF actions, including acquisitions.

## **D. CONGRESS**

### **1. Interest in the Deal**

There are, as stated earlier, several motivations for congressional leaders to support the lease or sale of Boeing 767 aircraft to the USAF. The first point of congressional support, which was touched upon briefly above, is for those Boeing and Boeing subcontractor jobs the KC-767As would continue to support for approximately ten years. The loss of jobs in a congressional district could lead to a possible defeat for that congressmen/women during the next election. See Table – for a partial presentation of the relationships.

As politics go, it is all about building consensus and nowhere is it more prevalent than congress. Consensus is defined by Merriam-Webster as “general agreement... the judgment arrived at by most of those concerned... group solidarity in sentiment and belief.” Furthermore, the term "consensus-building" (sometimes called "alternative dispute resolution" or ADR) actually refers to a variety of approaches.<sup>76</sup> Generically, they are voluntary processes in which the participants seek a mutually acceptable resolution of their differences.<sup>77</sup> The process of building a consensus in Congress; a congressional leader will offer support to another congressman's interest. In turn, reciprocation is expected for support of his own interest. This system of consensus building is otherwise known as the ‘good ol’boy network’ and normally results in one

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<sup>76</sup> Gail Bingham. *What is consensus building and what does it mean to resource management*. Retrieved May 2, 2004 from [http://www.resolve.org/pub\\_articles/WhatIs.htm](http://www.resolve.org/pub_articles/WhatIs.htm)

<sup>77</sup> Ibid

congressional leader lending support to an issue that seems otherwise unbeneficial to him or her.

Like the USAF, Congress has vested interest in ensuring the aerospace industrial base remains strong to meet any threat to the national security of the United States.

## **2. Conflict with Other Parties**

Congress itself has inner-conflict due to members on opposite sides of the Air Force lease arrangement with Boeing. Even those who normally favor maintaining a strong defense infrastructure are not totally committed to supporting the lease deal. Additionally, Congress has the traditional conflicts with governmental watchdog organizations – such as POGO. In general, these conflicts hurt the deal as it is these conflicting parties that publicize another ‘government bail out at the taxpayers expense.’

## **3. Relationship with Other Stakeholders**

Congress controls the purse strings of the armed services and ultimately controls the spending of the services. Without the congressional approval of spending, the procurement of these 100 KC-767s cannot be executed without legal ramifications. Congress also has an overall vested interest in the financial well-being of corporations of the United States – mostly because of employment, local economic, and national economic reasons. The average congressman understands that they represent their constituents and that it is their constituents that vote them into or out of office. Allowing a business unit to close in their ‘backyard’ would surely mean defeat in the next election.

# **E. WHITEHOUSE**

## **1. Interest in the Deal**

The Whitehouse has a vested interest in the deal because it affects the outcome of the strategic abilities of the U.S. military in maintaining the highest level of national security. This concern has risen to new heights since the tragic events of September 11, 2001. If the refueling aircraft are not added to the inventory there is a possibility the U.S.

may have a shortfall in its re-fuel capabilities, according to the information given to the Whitehouse by the Air Force.

The Whitehouse also has a vested interest in the survival of the U.S. based aerospace industry – strategic, because of the implications of possibly losing more of the aerospace industrial capacity. ”At the end of World War II, some 14 experienced prime contractors competed for government fighter and bomber R&D programs. By the turn of the millennium, there may be only two.”<sup>78</sup>

## **2. Relationship with Other Stakeholders**

The Whitehouse has an inter-locking relationship with the Congress, Boeing, and the USAF that affects the lease deal. The relationship with Congress is one in which the Whitehouse wants to build coalitions in order to make progress on its agenda. However, the President does not want to force unpalatable acquisitions. For the most part, the Whitehouse supports the KC-767 deal with a majority of Congress. The Whitehouse has also a unique relationship with the USAF that also lends support for the deal. The USAF is subordinate to the executive branch; therefore the Whitehouse wants to support this subordinate agency, especially since the deal is being sold to the Whitehouse as ‘mission critical.’ Finally, the Boeing Company’s relationship with the Whitehouse can be classified as having a negligible influence regarding the support of the deal. Other than Boeing contributing \$5,000 for the up and coming Presidential re-election campaign there is no real relationship between Boeing and the Whitehouse.

## **F. CONCLUSION**

There are five main parties involved that can affect the outcome of the lease deal. The pervasive attitude of the parties involved is to support the lease deal. In general, there are opposition parties, groups and individuals that can cause considerable attention to a deal that is considered to be bad. This can cause neutral parties to call for General

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<sup>78</sup> Rand Corporation. Project Air Force. *Down Sizing the U.S. Aerospace Industry: What are the implications for Military Aircraft?* Retrieved May 2, 2004 from <http://www.rand.org/paf/highlights01/downsizing.html>

Accounting Office, Congressional Budget Office, and other investigatory bodies to evaluate the financial soundness of the deal. However, there are more parties involved and affected by the outcome of this deal other than Boeing and the USAF. Since most of stakeholders support the deal, it is likely the deal will happen, unless it can be proven that ethical violations have jaded the decision makers.

## **V. LEASE VS. PURCHASE ANALYSIS**

### **A. OPERATIONAL LEASE VS. CAPITAL LEASE**

One of the biggest points of contention surrounding the lease proposal is whether or not the terms put forth by the Air Force met the requirements of an operational lease. Congress appropriates funding for an operational lease each year as part of Operations and Maintenance money. If assets are obtained under a capital lease, the money must be appropriated using procurement dollars. To have money appropriated for procurement, a weapons system must undergo the entire, lengthy, requirements and acquisition process.

According to the Office of Management and Budget (OMB) Circular A-11, to qualify as an operating lease the following six criteria must be met:

- 1) Ownership of the asset remains with the lessor during the term of the lease and is not transferred to the government at or shortly after the end of the lease term;
- 2) The lease does not contain a bargain-basement price purchase option;
- 3) The lease term does not exceed 75% of the estimated economic life of the asset;
- 4) The present value of the minimum lease payments over the life of the lease does not exceed 90% of the fair market value of the asset at the beginning of the lease term;
- 5) The asset is a general purpose asset and is not built to the unique specification of the government as lessee; and
- 6) There is a private sector market for the asset.<sup>79</sup>

According to the CBO and other observers the lease terms simply did not meet the criteria of an operational lease. Robert A. Sunshine, Assistant Director for Budget

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<sup>79</sup> United States. The Executive Office of the President. Office of Management and Budget. OMB Circular A-11 (2003), *Preparation, Submission, and Execution of the Budget*, Appendix B: *Scoring Lease-purchases and lease of capital assets*

Analysis, testified before the Senate Armed Services Committee on September 4, 2003. During his testimony he applied each of the criteria to the lease terms.

A CRS report titled *The Air Force KC-767 Tanker Lease Proposal: Key Issues For Congress*, updated September 2, 2003, summarized arguments as pertaining to each of the criteria. What follows is a synopsis of the report and Mr. Sunshine's testimony.

**1. Ownership Must Remain with the Lessor and Whether Ownership will be Transferred to the Government Shortly after the End of the Lease**

While the lease does call for the return of the aircraft after six years, there is no money allotted to return the aircraft to their original configuration. While a Special Purpose Entity, Wilmington Trust, will own the planes, the trust will essentially be under governmental control.

The lease also allows the Air Force to purchase the aircraft at any time during the lease if money is authorized and appropriated for that purpose. The lease price for the aircraft at the end of the term makes buying attractive to the Air Force.

The Air Force Report to Congress of 10 July, 2003, states DoD is committed to " earmark an additional \$2 billion in FY08 and FY09 for the purchase of aircraft covered in the multi-year pilot program."<sup>80</sup> As there is a continuing need for tankers in order to implement the National Security Strategy, there is little likelihood the USAF would return 100 tankers to the trust after retiring the entire fleet of KC-135Es.

Included in the lease cost is over \$600 million in construction projects to support the KC-767. It would be uneconomical to spend that money if the Air Force was seriously considering returning the aircraft.

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<sup>80</sup> United States. Air Force (July 10, 2003). *Report to the Congressional Defense Committees on the KC-767A Air Refueling Aircraft Multi-Year Pilot Program*, p. A2-1

**2. The Lease Does not Include a Bargain-Price Purchase Option**

The lease permits the Air Force to purchase the aircraft for \$35 million each (2002 dollars) at the end of the lease. The Air Force's own estimate is the aircraft could be sold as freighters for about \$51 million at the end of the term, a 15 percent savings.

CBO estimates the \$35 million to be 28 percent of the cost to purchase a new tanker. With a six-year lease, there should be more than 80 percent of life left in the aircraft. Paying 28 percent of the new purchase price for a used asset still having over 80 percent useful life constitutes a bargain-price.

**3. The Lease Does not Exceed 75% of the Economic Life of the Asset**

The six-year lease constitutes less than one-quarter of the estimated 25-30 year life of the aircraft.

**4. Present Value of the Lease Payments Does not Exceed 90% of Fair Market Value**

The Air Force Report to Congress indicates under the proposed arrangement the lease payments would account for 89.9 percent of the fair market value of the aircraft at \$138.4 million each. Included in the price is \$7.4 million in interest costs for Boeing's construction loan financing.

CBO argues including the financing costs is inappropriate because the interest is additional to the costs that would be capitalized if just purchasing the aircraft. In its report to Congress the Air Force acknowledges that if the financing cost are not included and the price per plane were \$131, the lease payments would increase to 93 percent to fair market value.<sup>81</sup>

Another problem arises with the Air Force estimates. Their cost assumptions are based on estimated bond interest rates. With the present value of the lease payments equaling 89.9 percent there is no room for interest rates to rise. The bonds are issued for each group of tankers to be built and leased. If in the future the interest rates of Treasury

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<sup>81</sup> United States. Air Force (2003, July 10). *Report to the Congressional Defense Committees on the KC-767A Air Refueling Aircraft Multi-Year Pilot Program*, p.7

bonds were to rise above the Air Forces assumptions, the 90 percent threshold would be exceeded.<sup>82</sup>

## **5. The Lease Must be for a General-Purpose Asset**

The asset cannot be built to the unique specifications of the government. An aerial refueling tanker is not a general-purpose asset. While the 767-200 is a commercial product, the extensive product modifications limit the ability for commercial application and aerial refueling is a unique government purpose. The Air Force cost estimates do not include the cost to “de-convert” the aircraft into their original configurations.

## **6. There Must be a Private Sector Market**

The argument the Air Force and Boeing made was the KC-767 was offered for public sale and was purchased by two other buyers, Japan and Italy. While this is true, there are currently only about two-dozen orders for all variants of 767s and the last 767-200 was delivered in 2002 and Boeing has no future orders.

The Air Force cost of approximately \$165 million each, including purchase option, is substantially higher than the \$60 million commercial cost of a 767.<sup>83</sup> It is unlikely there would be any in the commercial airline or freight industry willing to pay the price. Even if they were, it is unlikely there is a market for 100 KC-767s.

It appears apparent that CRS and CBO both see multiple reasons the proposed leased does not fit the criteria of an operational lease according to OMB Circular A-11. Sunshine and the CBO went as far as to say “...the proposal does not meet the conditions for an operating lease described in OMB Circular A-11 and thus does not comply with the terms of section 8159 of the DoD Appropriations Act, 2002.”

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<sup>82</sup> United States. Congress. Congressional Budget Office, Robert A Sunshine, Assistant Director for Budget Analysis, (2003, September 4). *Assessment of the Air Force's Plan to Acquire 100 Boeing Tanker Aircraft*, p. 10, Testimony before SASC.

<sup>83</sup> United States. Congressional Research Service – Library of Congress. CRS Report RL30056 (September 2, 2003), *Air Force KC-767 Tanker Lease Proposal: Key Issues for Congress*, p. CRS-64 Washington, D.C 20540-7000. This site <http://www.globalsecurity.org/military/systems/aircraft/kc-767.htm> has the figure at between \$100-\$112 million. The price of a new aircraft is difficult to determine as there are many things that can affect an aircraft price – overall economic situation, demand, labor issues, quantity to purchase, and configuration of aircraft all affect the price.

On September 4, 2003 Joel D. Kaplan, Deputy Director of OMB, testified before the SASC on the lease of Boeing KC-767s. He was there at the request of the committee to address concerns about lease instead of purchase and whether or not the lease was an operating lease. In his words, “Both of these issues were challenging, involving subjective judgments on difficult analytical questions.”

On the subject of whether or not it was an operational lease he spoke about the “considerable ambiguity” in Circular A-11 and how there could be honest disagreement as to its interpretation, especially as the proposal was “right at the margin.” He continued, “In light of the Air Force’s conviction that these planes are needed to meet urgent military need, and in light of clear Congressional intent to support a lease, as expressed in legislation, OMB believed it appropriate to resolve ambiguities in favor of classifying this transaction as an operating lease.” With this, debate was effectively over as to the type of lease. Debate of the cost continues still.

## **B. COST ANALYSIS**

Of all aspects of debate surrounding the proposed lease of KC-767s, cost has received the most attention. The first real examination of the cost of the lease was in the July 10, 2003, Air Force Report to the Congressional Defense Committees on KC-767A Air Refueling Aircraft Multi-Year Lease Pilot Program. The Air Force used OMB Circular A-94 for their financial analysis.

A-94 directs a present value comparison be performed to evaluate a proposed lease and hypothetical purchase based on the same delivery/return profile. The A-94 test relies heavily on the underlying assumptions required to perform the comparison, assumptions such as purchase price, expected inflation and appropriate discount rate.

When the Air Force applied the A-94 test they found the net present value of the comparison in favor of purchase by \$150 million, see Table 4. In its own analysis the Air Force admits the difference could be dramatically different under other circumstances. In a footnote the report states:

	<b>Lease</b>	<b>Purchase</b>
<b>Lease Payments w/ A/C return</b>	<b>\$11.4B</b>	<b>N/A</b>
<b>Purchase Payments non-MYP w/ A/C sold</b>	<b>N/A</b>	<b>\$11.3B</b>
<b>Ops and Support</b>	<b>\$4.6B</b>	<b>\$4.6B</b>
<b>MILCON and other Government Costs</b>	<b>\$1.2B</b>	<b>\$1.2B</b>
<b>TOTAL</b>	<b>\$17.2B</b>	<b>\$17.1B</b>
<b>Net Present Value Delta</b>	<b>\$0.15B (1%) Favoring Purchase</b>	

TABLE 4. LEASE VS. PURCHASE ANALYSIS (NPV\$)  
(From: Air Force Report to Congress, July 10, 2003)

The Air Force relied on the availability of the multi-year lease authority granted by Congress in 2002 Defense Appropriations Act. Had the Congress chosen instead to provide multiyear procurement authority and had the DoD been able to accommodate that execution while preserving program stability, the NPV could favor purchase by up to \$1.9 billion. While this information affords a measure of clarity in an equitable comparison of terms and NPV, it is provided with the understanding that neither multiyear procurement authority, nor related funding authorities were made available and, therefore, was not a viable option for the Administration's analytical consideration.<sup>84</sup>

The Air Force knew from the beginning the lease was going to be more expensive. "The advantages in schedule and reduced impact to current budget programs outweighed the results of the A-94 analysis and drove the leasing decision."<sup>85</sup> Under Secretary of Defense Aldridge put it this way,

This [lease] minimizes the near-term cost to the DoD and delivers the aircraft sooner. If we were to purchase the aircraft and deliver them on the same schedule as the lease, it would require billions of dollars more in our FYDP. And reallocating that amount of money for other programs would result in a loss of military capability.<sup>86</sup>

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<sup>84</sup> United States. Air Force (2003, July 10), *Report to the Congressional Defense Committees on the KC-767A Air Refueling Aircraft Multi-Year Pilot Program*, p. 4

<sup>85</sup> Ibid, p. 5

<sup>86</sup> Ibid

The Air Force referred to it as “An opportunity cost trade-off.” Some would say it is the Air Force wanting to have its cake and eat it too.

When CBO analyzed the lease it took into account that the Air Force would almost certainly buy the aircraft after the lease term. This would drive the cost per plane up to \$161 million. With that in mind, “CBO concludes that the Air Force would pay \$1.3 billion to \$2 billion (expressed in net present value terms) more to lease and then purchase the tankers than it would to purchase them outright.”<sup>87</sup>

### **C. FINANCING AND INVESTMENT**

In order to finance the lease the Air Force and Boeing were to set up a Special Purpose Entity (SPE). The SPE, called the KC-767A USAF Tanker Statutory Trust 2003-1 (the Trust), was to be the technical owner of the aircraft and the Air Force was to lease the planes from the Trust. The Trust was to purchase each KC-767 from Boeing for \$131 million. When bonds are issued, \$7.4 million per aircraft will be included for Boeing construction loan financing, totaling \$138.4 (2002 dollars) million per aircraft.

The Trust would issue bonds at the completion of each group of tankers. The \$138.4 million would cover the remainder of what Boeing is owed for each plane (including profit margin) and repay construction loan principal and interest. The SPE will issue three classes of bonds A, B and G. Each of the three tranches of bonds will be secured by different assets and carry differing risk.

The “G” tranche will be secured by the Air Force’s lease payments and will make up about one-third of the total lease costs. These are considered low-risk bonds as the U. S. government is essentially backing them. The projected rates will be about 1/2% point above projected Treasury rate for 2006-2011.

“A” bonds will be covering about half of the borrowing and will be secured by the value of the aircraft. “A” bondholders would be the second claimant in case of

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<sup>87</sup> United States. Congress. Congressional Budget Office, Robert A Sunshine, Assistant Director for Budget Analysis, (2003, September 4). *Assessment of the Air Force’s Plan to Acquire 100 Boeing Tanker Aircraft*, p. 3, Testimony before SASC.

termination. These too are considered low-risk and would require only 1% above the projected Treasury rate.

The final tranche of bonds would be the “B” bonds. Covering about 15% of the total cost, these bonds would be secured by the potential sale of the aircraft at the end of the lease. Since there is no guarantee Congress will appropriate the additional \$4.4 billion to buy the aircraft, these are considered more risky. The Air Force believes to attract investors a 10% interest rate compounded to the end of the lease is what would be required.

It should be noted that purchase would be an attractive option to the Air Force. They would have already paid for 90% of the planes and there would still be more than seventy-five percent of their useful life left. There is also the overriding need to maintain the tanker fleet numbers.

The entire arrangement of the SPE is due to the fact that the lease must be an operating lease under USAF terms. The Trust is established so Boeing does not have to lease the planes directly to the Air Force. If Boeing were to do so, it would have to carry the 767s on the books as assets as opposed to revenue and costs of goods sold on the income statement. Boeing would also not be able to pay off construction loans rapidly, but over time as the lease payments were made.

#### **D. ACQUISITION PROCESS**

The driving process of the DoD acquisition process is the DoD 5000 series documents. These documents direct policy and responsibilities of the people and organizations that are involved in the acquisition process. The “primary objective of Defense acquisition is to acquire quality products that satisfy user needs with measurable improvements to mission capability and operational support, in a timely manner, and at a fair and reasonable price.”<sup>88</sup> Furthermore the directive states that the acquisition “System exists to manage the nation's investments in technologies, programs, and product support necessary to achieve the National Security Strategy and support the United States Armed

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<sup>88</sup> United States. Department of Defense. Under Secretary of Defense, Department of Defense Directive Number 5000.1, May 12, 2003, *The Defense Acquisition System*, p2.

Forces.”<sup>89</sup> The overarching reach of the 5000 series - it applies to all acquisition programs. An acquisition program is defined by the 5000 series as “directed, funded effort that provides a new, improved, or continuing materiel, weapon or information system or service capability in response to an approved need.”<sup>90</sup> One of the mainstays of the policy is to promote competition because it promotes innovation, reduces cost, and increases quality.

The other major sets of documents that drive the DoD acquisition process are the CJCS 3170.01 manuals and instructions. These describe the joint acquisition process and the joint examination process to ensure the synchronization of joint compatibility, otherwise known as the Joint Capabilities Integration and Development System (JCIDS). JCIDS, combined with the oversight of the Joint Requirements Oversight Council (JROC) establishes a set system to integrate a material solution into the joint environment.

For this examination, the new DoD 5000 Series, dated May 2003, will be used as the guide. During the initiation of the KC-767 acquisition, an interim set of 5000 Series instructions was in existence. This set of instructions had a slightly different structure; however, the basic principles and methodology are the same. The main difference between the two sets of instructions is when a “program” is designated. Once designated a “program,” a Program Manager is appointed and specific monies are granted for testing, production, fielding, and sustainment of the system. The interim instructions established a program at Milestone “A,” the new set establishes a program at Milestone “B.”

The intent of this part of the chapter is to examine the acquisition process at the macro level and determine what steps were left out of the KC-767 acquisition process. The concepts explained here will not be complete nor in depth as a study of the acquisition process is a topic of study unto itself. An additional assumption made in

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<sup>89</sup> United States. Department of Defense. Under Secretary of Defense, Department of Defense Directive Number 5000.1, May 12, 2003, *The Defense Acquisition System*, p2

<sup>90</sup> Ibid

constructing this analysis is that the KC-767 would have been an Acquisition Category (ACAT) 1D program.

## **1. Normal Process**

### ***a. Requirements Generation***

The normal acquisition process starts with the requirements generation process. This process is the same for all services starting with the National Security Strategy (NSS) up through Defense Planning Guidance (DPG). After the DPG, the service leaders (Secretary and Service Chief) inject their own guidance. The services then conduct a doctrinal analysis based on the strategic guidance given, which involves threat analysis, specific scenarios, and a constrained force. A brief description of the NSS, National Military Strategy (NMS), Quadrennial Defense Review (QDR), and Defense Planning Guidance (DPG) are briefly discussed in the next four paragraphs.

National Security Strategy: Describes the threats and major security concerns of the United States and outlines the President's priorities for dealing with them. It is prepared periodically – when the security environment changes or with the changing of the President.

National Military Strategy: Describes the strategic environment, develops national military objectives and describes the military capabilities required to execute the strategy. The NMS also addresses force structure requirements for the Navy, Air Force, Marine Corps, Coast Guard, Special Operations Command and Reserve Components.<sup>91</sup>

Quadrennial Defense Review: This report is required by law, every four years. The report is due to Congress by the end of September in the year after a presidential election. The QDR report address the total force required to implement the President's national security strategy and supporting NMS, at prudent military risk.<sup>92</sup> In the absence of a current NMS the QDR is used to give interim guidance.

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<sup>91</sup> United States. Army. Army Force Management School (2003, January). *Total Army Analysis Primer 2003*. p10. Fort Belvoir, VA

<sup>92</sup> Ibid

Defense Planning Guidance (DPG): The DPG is the principle planning guidance and direction from the SECDEF to the military departments that includes major planning issues and decisions, strategy and policy, strategic elements, the Secretary's program planning objectives, the Defense Planning Estimate, the Illustrative Planning Scenarios, and a series of studies. The DPG accounts for the President's National Security Objective priorities from the National Security Strategy (NSS). The DPG takes into account the previous year's DPG, Program Decision Memorandums (PDMs), and the budget, along with the National Military Strategy (NMS). DPG development relies on extensive dialogue between OSD, the Joint Chiefs of Staff, the combatant commanders, and the Services.<sup>93</sup>

Once the analysis is conducted, the shortcomings are determined and examined against the Doctrine, Organization, Training, Material, Leadership, Personnel, and Facilities (DOTMLPF) model. This DOTMLPF model is a joint concept used to integrate a collaborative process to define desired capabilities to guide the development of affordable systems.<sup>94</sup> DOTMLPF is a process which does not always result in a material solution for a shortcoming. Instead it looks at all possible solutions to a shortcoming and when a solution is found, it is used to ensure there are no adverse affects on its other parts. With a possible solution identified, the Initial Capabilities Document (ICD) is constructed. There are other ways in which shortcomings are determined. They can be determined by changes in current technology or the emergence of new technologies as observed by a service's science department or command. Shortcomings can also be determined by COCOM during joint deployments and experiments. Either way, once a shortcoming is determined the requirements generation process is started. The KC-767 is the material solution to what was a perceived shortcoming – the possible grounding of the KC-135 fleet due to a catastrophic failure or safety concern.

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<sup>93</sup> United States. Army. Army Force Management School (2003, January). *Total Army Analysis Primer 2003*. p10. Fort Belvoir, VA

<sup>94</sup> United States. Department of Defense. Under Secretary of Defense, Department of Defense Directive Number 5000.2, May 12, 2003, *Operation of the Defense Acquisition System*, p4

The ICD, formally the Mission Needs Statement, defines the capability gap in terms of the functional area(s), the relevant range of military operations, time, obstacles to overcome and key attributes with appropriate measures of effectiveness, e.g., distance, effect (including scale), etc.<sup>95</sup> The ICD also captures the evaluation of different material approaches, the associated costs, efficiency, sustainability, environmental quality impacts, and risks posed by the material approach(es) under consideration.<sup>96</sup> This analysis helps to shape and provides input into the AoA.

The AoA is an evaluation of the advantages and disadvantages of alternatives being considered to satisfy a requirement, to include the sensitivity of each alternative to possible changes in key assumptions or variables.<sup>97</sup> The analysis shall aid decision-makers in judging whether or not any of the alternatives offer sufficient benefit to be worth the cost.<sup>98</sup>

Once the ICD is constructed, the Program Objective Memorandum (POM) for the service, or lead component if it is a joint project, is updated. This process is the mechanism for obtaining Budget Authorization (BA) from Congress for Research and Development funding, or other types of funding as required, to support a material project up to Milestone B. Once the project passes the Milestone B, funding is apportioned through the Under Secretary of Defense, Acquisition, Logistics, and Technology (USD(AT&L)) to support that program.<sup>99</sup>

#### ***b. The Acquisition Framework***

The basic acquisition framework can best be described as a five phase system with six major events. The phases of the framework are Concept Refinement,

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<sup>95</sup> United States. Department of Defense. Joint Chiefs of Staff. CJCSI 3170.01D, (2003, March 12). *Joint Capabilities Integration and Development System*.

<sup>96</sup> Ibid

<sup>97</sup> Jim Cooke, OSD/PA&E/LF, Definition of AoA, (1998, February). Retrieved from the Defense Acquisition Deskbook, Version 03/31/2002

<sup>98</sup> Ibid

<sup>99</sup> In keeping with the spirit of the 5000.2 series instructions we will use two terms to address a system that is in development. Project for a system that has not yet passed the Milestone B decision and Program for a system that has passed this milestone.

Technology Development, System Development and Demonstration, Production and Deployment, and Operations and Support. The six events of the framework are Concept Decision, Milestone A, Milestone B, Design Readiness Review, Milestone C, and the Full Rate Production (FRP) Decision Review. Depending upon the maturity of the technology or system whether or not a system is already available through the commercial market place or if a system can be built out of existing systems or altered from other Non-Developmental Items (NDI), a project/program can be entered at any milestone. See Figure 8 for a pictorial presentation of the acquisition framework. See Figure 9 for a pictorial presentation of the whole process with the evolution process included. There are different levels of programs, dependant upon the Research, Development, Testing and Evaluation (RDT&E) or procurement dollar amount.

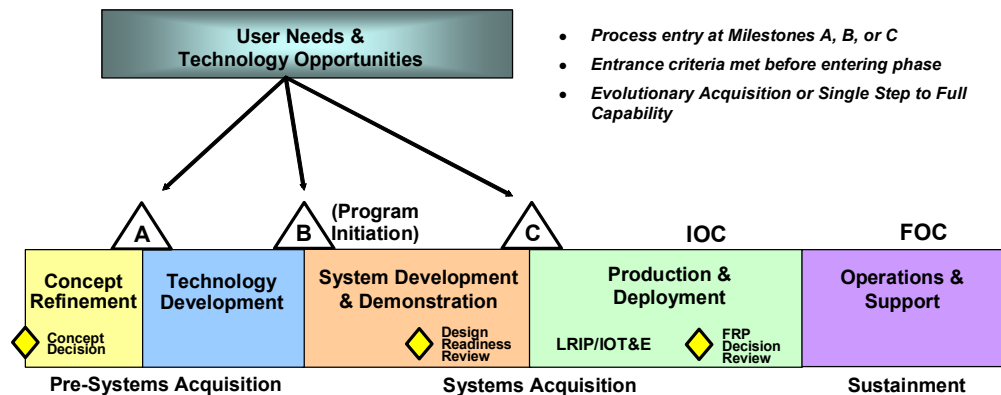


FIGURE 8. DEFENSE ACQUISITION MANAGEMENT FRAMEWORK  
 (Source: *Operation of the Defense Acquisition System, DoD Instruction 5000.2, May 2003*)

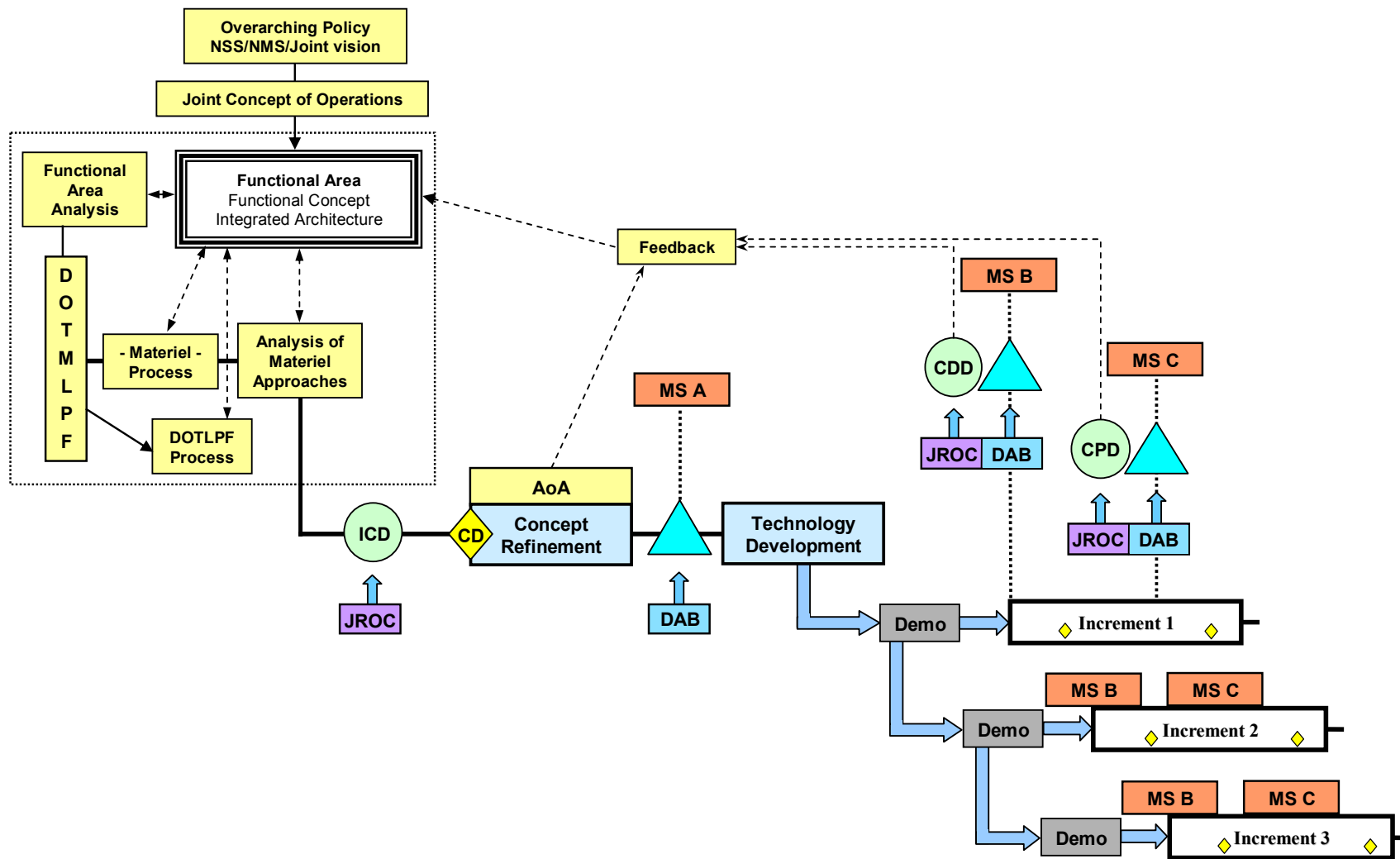


FIGURE 9. REQUIREMENTS AND ACQUISITION PROCESS DEPICTION

(Source: Operation of the Defense Acquisition System, DoD Instruction 5000.2, May 2003)

## (1) Phases of the Acquisition Framework

The Concept Refinement (CR) phase is guided by the ICD and AoA. The focus of the CR phase is to refine the initial concept and develop a Technology Development Strategy (TDS). The TDS details the rationale for adopting an evolutionary or single-step-to-full-capability strategy; the program strategy including overall cost, schedule, and performance goals for the Research and Development program.<sup>100</sup>

The Technology Development (TD) phase is guided by the ICD and TDS. The focus of the TD phase is to reduce the technology risk and determine the appropriate set of technologies to integrate into a full system.<sup>101</sup> The entrance into the TD phase means that the project has passed the Milestone A decision. The TD phase is characterized by technology demonstrations. This phase produces usable, affordable, and relevant technologies that can be integrated into the system. The other output of the TD phase is the Capability Development Document (CDD) which builds on the ICD and provides the detailed operational performance parameters required to design the proposed system.<sup>102</sup>

System Development and Demonstration (SDD) phase is the start of an official program and starts with the Milestone B decision. This phase has two distinct efforts: System Integration and System Demonstration. System Integration focuses on the integration of sub-systems to produce a complete and functioning system. The System Demonstration focuses on demonstrating that the system does what it was built to do. SDD is characterized by the building of a system and testing of the system in an operational environment.

Production and Deployment (PD) phase commits the DoD to the production of a system. It starts with the Milestone C decision. The entrance criteria for this phase is the successful completion of: performance, production risk mitigation, manufacturing processes, interoperability, operational supportability, and affordability

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<sup>100</sup> United States. Department of Defense. Under Secretary of Defense, Department of Defense Directive Number 5000.2, May 12, 2003, *Operation of the Defense Acquisition System*, p4

<sup>101</sup> Ibid, p5.

<sup>102</sup> Ibid, p6.

determination throughout the lifecycle. This phase also has two distinct phases: Low-Rate Initial Production (LRIP) and Full-Rate Production (FRP). LRIP focuses on establishing and validating the production process. FRP focuses on producing sufficient quantities, fielding and conducting initial training.

The Operation and Support phase has two distinct purposes: Sustainment and Disposal. The sustainment phase focuses on all the aspects of keeping the system running while in use by the service(s). This includes supply, maintenance, transportation, sustaining engineering, data management, configuration management, manpower, personnel, training, survivability, environment, safety, occupational health, supportability and interoperability functions.<sup>103</sup> The disposal phase consists of demilitarizing the system and disposing of it according to applicable laws and regulations.

## (2) Events of the Acquisition Framework

The six events of the acquisition framework are the major points that thrust the system into the next phase. The decisions are made by the Milestone Decision Authority (MDA), who is appointed according to the category of the program. At each one of the key events the MDA reviews, and approves or disapproves all the documents associated with it. These associated documents are either mandated by statute, regulation, or contracting reporting information. The Concept Decision starts the CR phase of the acquisition process and is the first event that starts the acquisition framework. Below is a listing of the other events with their associated reports as taken from DoD 5000.2, Enclosure 3. In many cases a report is required more than once in the acquisition framework.

The Milestone A decision includes approval of the: Consideration of Technology Issues, Market Research, Technology Development Strategy, Certification of compliance with the Clinger-Cohen Act, ICD, AoA, Test and Evaluation Strategy, Exit Criteria, and the Acquisition Decision Memorandum (ADM).

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<sup>103</sup> United States. Department of Defense. Under Secretary of Defense, Department of Defense Directive Number 5000.2, May 12, 2003, *Operation of the Defense Acquisition System*, p4

The Milestone B decision includes approval of the: Consideration of Technology Issues, Market Research, Clinger-Cohen Act Compliance, Registration of mission-critical and mission-essential information systems, Benefit Analysis and Determination, Programmatic Environment Safety and Occupational Health Evaluation, Spectrum Certification Compliance, Industrial Capabilities, LRIP Quantities, Independent Cost Estimate, Core Logistics Analysis/Source of Repair Analysis, TDS, Acquisition Program Baseline, Cooperative Opportunities, Certification of compliance with the Clinger-Cohen Act, ICD, Concept Development Document, Acquisition Strategy, AoA, System Threat Analysis, Technology Readiness Assessment, Independent Technology Assessment, Affordability Assessment, Cost Analysis Requirements Description, Test and Evaluation Master Plan, Operational Test Agency Report of Operational Test and Evaluation Results, Program Protection Plan, Exit Criteria, and ADM.

Design Readiness Review provides a mid-phase review of the design maturity. The MDAs will determine the form and content of this review. This review moves SDD out of the System Integration phase and into the System Demonstration phase.

Milestone C decision includes approval of the: Consideration of Technology Issues, Clinger-Cohen Act Compliance, Registration of mission-critical and mission-essential information systems, Benefit Analysis and Determination, Programmatic Environment Safety and Occupational Health Evaluation, Spectrum Certification Compliance, Industrial Capabilities, Independent Cost Estimate, TDS, Acquisition Program Baseline, Cooperative Opportunities, Certification of compliance with the Clinger-Cohen Act, ICD, Capabilities Production Document, Acquisition Strategy, AoA, System Threat Analysis, Technology Readiness Assessment, Independent Technology Assessment, Affordability Assessment, Cost Analysis Requirements Description, Test and Evaluation Master Plan, Operational Test Agency Report of Operational Test and Evaluation Results, Program Protection Plan, Exit Criteria, and ADM.

Full Rate Production (FRP) Decision Review includes approval of the: Clinger-Cohen Act Compliance, Post-Deployment Performance Review, Registration of mission-critical and mission-essential information systems, Beyond LRIP Report, Programmatic Environment Safety and Occupational Health Evaluation, Independent Cost Estimate, Live-Fire Test and Evaluation, Acquisition Program Baseline, Certification of compliance with the Clinger-Cohen Act, Acquisition Strategy, AoA, Interoperability Certification, Test and Evaluation Master Plan, Operational Test Agency Report of Operational Test and Evaluation Results, Exit Criteria, and ADM.

## **2. How the Lease Bypassed the Normal Process and Ramifications**

A capital lease will and should conform to the normal acquisition process. However, an operating lease can by pass the process because of the differing types of funds that are being used. In a Capital Lease the acquisition will be conducted with procurement funds, just like the normal acquisition procedures outlined a regular buy or acquisition. An Operating Lease will use the Operation and Maintenance (O&M) funds. These are the same funds that are used by the services to conduct their normal business activities; purchase fuel and supplies, rent/lease property and facilities for short periods of time, and other operation sustainment operations. Clearly the, operating lease method required by the OMB is the mechanism that allowed the USAF to by pass the “normal” acquisition system.

What is not clear is how the Air Force conducted the procedural and reporting process that is required of a major acquisition, such as tankers. Looking at the historical timeline as presented in Chapter II, part B, there is no indication that any of the JCIDS process, as discussed in part D of this chapter, was conducted. This means that no other agency, other than the Air Force, looked at all current and future joint and Allied requirements for re-fuel operations. The ability to re-fuel aircraft is not just an Air Force issue; it affects the strategic capabilities of both the U.S. and its Allies. It could be argued the purchase of a new tanker system would be conducted under the auspice of a commercial or NDI acquisition since the alternatives that the Air Force examined were

the Airbus A330 and the Boeing KC-767. However, as discussed in part D of this chapter, even a commercial or NDI purchase is subject to the whole process.

During the requirements generation phase a TDS is developed, which drives the development of the AoA and its evaluation. At the time of completing this project, an AoA has not been developed by the USAF. The AoA is one of the most important documents that results out of the requirements generation phase of an acquisition. As described earlier, it evaluates the advantages and disadvantages of alternatives being considered and the sensitivity of each alternative to possible changes in key assumptions or variables. The AoA is one of the few documents that is updated for each milestone decision, ensuring no change has occurred in assumptions or technologies that affects the decision to continue with the project/program. As such, it can be concluded that only existing commercial aircraft currently capable of conducting tanker operations were examined, and no other technologies or future airframes and concepts have been examined.

The KC-767 would have been an ACAT 1D program. The procurement costs clearly exceed the \$2.1 billion threshold (in 2000 year constant dollars) for ACAT I. Since a tanker program has joint and allied implications, the USD(AT&L) would have retained the Decision Authority on the program, but if not the program would have been a ACAT 1C. Either way, the ACAT 1 categorization would have resulted in a tremendous amount of oversight that is not present in this acquisition.

An ICD/ORD was written to support the acquisition; however, its rigid specifications restricted the ability to foster a truly competitive acquisition. Without adequate competition in an acquisition the Government is not receiving a best value. Competition fosters innovative concepts and ideas resulting in better products and systems than conceived by the user or organization with a need. Competition keeps the prices fair and reasonable ensuring that the Government pays no more than the fair market value.

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## **VI. DISCUSSION, SUMMARY, RECOMMENDATIONS**

### **A. UNITED STATES AIR FORCE ISSUES**

The status quo would be for the Air Force to continue operating its existing KC-135 fleet and continue with their original plans to begin recapitalization of the tanker fleet through normal appropriations procedures in the out years of the FYDP. In support of the status quo, recent changes in operations at PDM facilities have increased availability of KC-135Rs. Since more airframes are now available for refueling operations, is it necessary to lease new tankers by FY06?

There is little doubt the Air Force knew leasing the planes was going to be more expensive than a normal acquisition buy. As one would expect, their assumptions in calculating the NPV of the lease option favored the leasing argument. What would have been the result if the Air Force had from the very beginning said, “We understand a lease is more expensive. But we need the assets now.” As opposed to putting forth a poor proposal and continuing to assert that their obviously misleading numbers presented the best value for the taxpayer.

Was it necessary to lease 100 tankers? And is a six-year operating lease the best value?

There is no doubt that the USAF eventually needs a replacement for the KC-135. Is there time to proceed with the lengthy procurement process before the need becomes immediate? Part of the process requires the AOA. It is required to ensure the best asset for the mission requirement will be procured. Without that, why would the Air Force want to jump head first into the KC-767, which does not significantly increase refueling capacity compared with other options? With an AOA the Air Force would be confident they are getting the best overall aircraft.

Another option not discussed by the Air Force involves different lease structures where the NPV is closer to the actual value of a purchase. Could the deal have been made a better value if options had been introduced? As it stands, for budget purposes, the Air Force officials could not structure the lease arrangement with Boeing as a capital

lease. They fall into the classic dilemma of not wanting to sacrifice any acquisition program for another program, in this case the tankers. Since an operating lease was the only lease method permitted, would an operating lease stretched out over ten or more years result in a more feasible alternative? With an average aircraft service life of over thirty years, a ten or twenty year lease term is still below the 75 percent maximum of service life to qualify as an operating lease. The Air Force would have received more aircraft use for the same amount of money. Of course, they would still have to maintain the present value of lease payments at 89.9 percent of the purchase price or market value of the aircraft, as in the original USAF calculation.

What other financing options were available to the Air Force when the decision was made to proceed with the lease option? There were numerous options but none were explored because no AOA was performed. What follows is a brief discussion of some of those options and whether or not they would have been viable.

## **B. PRIVATE FUNDING INITIATIVE AND OUTSOURCING**

The private funding initiative (PFI) being undertaken by the United Kingdom could be a program to emulate. The UK solicited bids from private firms to offer aerial refueling services. The initiative is to provide the Royal Air Force (RAF) with the tankers and support services. What is so unique about the PFI is the RAF owns only the services of the fleet, not the 10 aircraft, for 27 years.

“AirTanker is set to become the industrial partner for the £13bn (\$23.9B) UK Ministry of Defence air-to-air refueling programme, covering a 27 year service period. With a 40 percent shareholding, EADS is the largest partner in AirTanker and responsible for the full integration of the aircraft. It would be the largest defence PFI (Private Financing Initiative) ever.”<sup>104</sup>

While it is uncertain that a program such as this would work for the USAF, it is an alternative financing arrangement to explore, especially in the short term. While EADS

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<sup>104</sup> Retrieved 30 May, 2004 from EADS Homepage,  
<http://www.eads.net/frame/lang/de/1024/xml/content/OF00000000400003/6/51/427516.html>

and Airbus do not currently have a boom-configured aircraft, it does not seem to be too far a stretch to think they would be able to engineer one.

There is only one company currently offering tanker services for lease, Omega Air. While Omega will not operate in a theater of operations, they do offer the services for overseas transit. As discussed previously, the Navy is already procuring refuel services from Omega, which offers its services to any probe equipped aircraft. But it should not be difficult for Omega to install the equipment to refuel boom-equipped aircraft if there was a market demand for such services. As part of their plans to expand their refueling fleet, Omega has already purchased DC-10s and DC-9s to add to their current 707s. Given this business model, how many aircraft, with how many independent vendors, would it take to supply the Air Force with the needed refueling capacity for operations within the United States and for overseas transits?

### **C. RETROFITTING SURPLUS AIRCRAFT AS TANKERS**

While there are currently only a dozen DC-10s available for refit as refuel tankers, this possibility should be examined to determine if the DC-10s might be used as a stop-gap measure until an AOA is performed for procuring or leasing a more suitable replacement aircraft. This option is further supported by the Air Force's own operating specifications which apply a modifier of 1.95 to a KC-10 when compared to a KC-135. This means that a single KC-10 is valued at almost two KC-135s when comparing the mission capability of each aircraft.

If the dozen DC-10s were converted into KDC-10s this would go a long way to filling the gap necessary to accomplish an AOA. There is also the advantage of already having the infrastructure in place to support KDC/KC-10s. However, a problem may arise due to the fact that these are used aircraft with varied histories.

The Air Force has prior experience in purchasing used airframes for retrofit. In order to field the J-8 JSTARS aircraft the Air Force bought used commercial Boeing 707s. The 707 was chosen because so many of the other aircraft types are based on the 707. The Air Force experienced extensive problems resulting from their decision to

utilize used aircraft; corrosion being the biggest. After having such problems the Air Force initiated a rigorous inspection program for acquiring additional used aircraft.

In the case of the surplus DC-10s, each could be purchased for about \$30 million. While it is difficult to estimate how much it would cost to refit a DC-10 into a tanker, an educated guess would be \$55.5 million for each aircraft. This figure comes from the fact that conversion of the Royal Netherlands Air Force KCD-10s was \$45 million, \$55.5 million in 2004 dollars.<sup>105</sup> This gives a figure of approximately \$86 million for a used DC-10 converted into a tanker. Allowing for additional work that may be needed to restore the used aircraft, an estimated \$90 million per plane will result in a total cost for purchasing and refitting a dozen DC-10s of around \$1.1 billion for a big addition to the Air Force's tanker fleet capacity. Using the above-mentioned Air Force 1.9 multiplier, the DC-10s would be the operating equivalent of almost 23 KC-135 planes. And, this added capacity for less than \$1.1 billion. Of course, the remaining service life of the DC-10s must be factored into the evaluation.

With immediate availability of the used DC-10 airframes and a year's worth of conversion work, based on what was planned for new Boeing 767s, this alternative would bring very capable KDC-10s on-line sooner than Boeing could with the KC-767s. The only problem the Air Force encounters is again, a trade-off in the short-term budget between competing programs to find the estimated \$1.1 billion.

#### **D. PROJECT SUMMARY**

To summarize this project we conducted interviews and examined many documents to investigate the issues of this proposed acquisition. First, in Chapter II, an examination of the history of the KC-135 was conducted along with a review of the key events in the history of this tanker system. The key events also included the current events regarding the proposed lease/acquisition of the KC-767. A review of the current systems, KC-135 and KC-10, was done to highlight the capabilities of each.

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<sup>105</sup> United States. Department of Defense. Under Secretary of Defense (AT&L), May 2004, Defense Science Board Task Force report on Aerial Refueling Requirements, p. ix. Retrieved June 11, 2004 from <http://www.fas.org/irp/agency/dod/dsb/>

Furthermore, the capabilities of the KC-767 as proposed by the Boeing Company were highlighted and then compared to the system that it would replace/augment, the KC-135.

In Chapter III a review of the possible alternatives to replace and augment the KC-135 was conducted. Specifically a comparison between the KC-10 and KC-135 highlighted the advantages of the KC-10 over the KC-135, suggesting that KC-10 should be the benchmark for future tanker requirements. Then an introduction of the USAF air-mobility concept aircraft, called the KC-X, briefly showed what the USAF would like to have in a modular and multi-use aircraft. Additionally, the recent idea to use used DC-10-30CF aircraft, converted into KDC-10 tankers, was introduced as a current solution to other nation's tanker requirements. Finally, Chapter III included a discussion on the current U.S. Navy outsourcing of re-fueling requirements, which demonstrated, along with the KDC-10, there are other solutions to a tanker shortfall other than acquiring new aircraft.

Chapter IV examined the influences and external pressures that exist on an acquisition program. It highlighted only five of many hundred groups that have a stake in the purchase of a new DoD system.

The fifth chapter was analysis of the administrative aspects of an acquisition. It compared the operating and capital lease mechanisms; doing so in accordance with the requirements set forth by the GAO for an operating lease. A cost analysis was done comparing the operating lease and an outright purchase proving the purchase option was a better value for the Government. Next the special trust entity and types of bonds with their projected returns are introduced to show how the Government and Boeing were going to execute the lease financing. Finally, in this chapter, an outline of the acquisition process was conducted. It starts with the requirements phase of an acquisition, how it ties into the acquisition framework, and an overview of the acquisition framework in the simplest terms. This section ends with a brief examination of how the operating lease bypassed the current acquisition system and what steps were left out.

## **E. RECOMMENDATIONS & CONCLUSIONS**

Four separate recommendations follow:

1) An operating lease should not be used to procure a major system, especially for an ACAT I program with joint implications. The operating lease, especially in the case of the KC-767, bypasses the acquisition process by leaving critical reviews and reports out. Without adequate oversight, an agency skipping steps in the process and not performing the necessary analysis could miss critical requirements, such as joint and allied compatibility. Additionally, as in the case of this acquisition, the agency could spend an enormous amount of time defending their position. This is due to the perception of the acquisition being an unscrupulous corporate bailout or simply ill conceived; the acquisition process is normally a highly scrutinized process to begin with even when everything is considered straightforward and clean.

2) An operating lease should be contemplated only for acquisitions that are limited in scope. However, care must be taken to ensure there is not a loss in the acquisition process. For a system whose requirement is not going away anytime in the foreseeable future, an operating lease will end up costing more over the life of the lease. It is true the operating lease is cheaper in the short term. However, it is shown in this report that it costs more in the long term.

3) Multi-use aircraft should be seriously considered for the next refueler permanently replacing the KC-135. Using the KC-10 as an example, it can be seen the KC-10 is more capable than the single purpose KC-135 in several uses. The next aircraft acquired by the USAF should use the KC-10 as the threshold or baseline for the establishment of KPPs.

4) The U.S. Government should not lease or acquire the KC-767s at all. If interim capability is truly required there are at least two alternate solutions provided in this report. a) Outsourcing the surges in refueling requirements to private contractor – Omega Air is currently the only private company in the business but, if the market exists, other vendors will surface. b) Retrofitting DC 10-30 CFs into KDC-10s to provide a near term increase in tanker capacity; this is the option that the Royal Netherlands Air Force

has opted to use as a primary solution to their refueling requirements. The cost is substantially less than the \$131 per KC-767 with an estimated cost of only \$86 million in 2004 dollars. It is important to note that this used but reconfigured aircraft has twice the capability as the KC-767 for less money.

#### **F. DIRECTION FOR FUTURE RESEARCH**

Ethics in acquisition was not addressed, as it was not in the initial scope of work. However, with the actions that took place with the proposed lease of the KC-767s, the ethical issues of government employees taking jobs with the private sector could be examined in a project all unto itself. The focus of this project could be to see if the Government should adjust its position on post Government employment ethics rules.

The proposed lease was said to have contained one of the most complex acquisition contracts in the history of the DoD. This was not studied due to this topic's scope. The focus could be to determine whether or not DoD acquisition rules hinder the acquisition process, in particular leasing.

A project topic for the future could be to perform and complete financial analysis comparing normal system and multi-year procurement cost with 10 or 20-year leasing mechanism - both operating and capital. The focus could be to see if an option exists where the government can use a lease to its benefit.

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## APPENDIX 1 TO CHAPTER IV: PRESENTATION OF CONGRESSIONAL RELATIONSHIP WITH BOEING

<b>767 Aircraft Production Locations</b>	<b>Representatives (3)</b>	<b>Senator (6)</b>
Everett, Washington	Richard Larsen (D-02)	Patty Murry (D-WA) and Maria Cantwell (D-WA)
Oak Ridge, Tennessee	John Tanner (D-08)	William Frist (R-TN) and Lamar Alexander (R-TN)
Wichita, Kansas	Todd Tiahrt (R-04)	Sam Brownback (R-KS) and Pat Roberts (R-KS)
 <b>Other Commercial Aircraft Production Locations</b>	 <b>Representatives (13)</b>	 <b>Senator (8)</b>
Anaheim, California	Loretta Sanchez (R-47)	Dianne Feinstein (D-CA) and Barbara Boxer (D-CA)
Canagoga Park, California	Henry Waxman (D-30)	Dianne Feinstein (D-CA) and Barbara Boxer (D-CA)
El Segundo, California	Jane Harman (D-36)	Dianne Feinstein (D-CA) and Barbara Boxer (D-CA)
Huntington Beach, California	Dana Rohrabacher (R-46)	Dianne Feinstein (D-CA) and Barbara Boxer (D-CA)
Irvine, California	Christopher Cox (R-48)	Dianne Feinstein (D-CA) and Barbara Boxer (D-CA)
Long Beach, California	Dana Rohrabacher (R-46)	Dianne Feinstein (D-CA) and Barbara Boxer (D-CA)
Palmdale, California	Howard McKeon (R-25)	Dianne Feinstein (D-CA) and Barbara Boxer (D-CA)
Seal Beach, California	Dana Rohrabacher (R-46)	Dianne Feinstein (D-CA) and Barbara Boxer (D-CA)
Sunnyvale, California	Anna Eshoo (D-14)	Dianne Feinstein (D-CA) and Barbara Boxer (D-CA)
Philadelphia, Pennsylvania	Robert Brady (D-01)	Arlen Specter (R-PA) and Rick Santorum (R-PA)
Auburn, Washington	Adam Smith (D-09)	Patty Murry (D-WA) and Maria Cantwell (D-WA)
Bellevue, Washington	Jennifer Dunn (R-08)	Patty Murry (D-WA) and Maria Cantwell (D-WA)
Issaquah, Washington	Jennifer Dunn (R-08)	Patty Murry (D-WA) and Maria Cantwell (D-WA)
Kent, Washington	Adam Smith (D-09)	Patty Murry (D-WA) and Maria Cantwell (D-WA)
Renton, Washington	Adam Smith (D-09)	Patty Murry (D-WA) and Maria Cantwell (D-WA)
Seattle, Washington	Jim McDermott (D-07)	Patty Murry (D-WA) and Maria Cantwell (D-WA)
Spokane, Washington	George Nethercutt (R-05)	Patty Murry (D-WA) and Maria Cantwell (D-WA)
Houston, Texas	Shelia Jackson-Lee (D-18)	Kay Hutchinson (R-TX) and John Cornyn (R-TX)

<b>Other Boeing Locations</b>	<b>Representatives (45)</b>	<b>Senator (46)</b>
Decater, Alabama	Robert Cramer (D-05)	Richard Shelby (R-AL) Jeff Sessions (R)
Huntsville, Alabama	Robert Cramer (D-05)	Richard Shelby (R) & Jeff Sessions (R)
Eareckson Air Station, Alaska	Don Young (R-At large)	Ted Stevens (R-AK) and Lisa Murkowski (R-AK)
Mesa, Arizona	Jeff Flake (R-06)	John McCain (R-AZ) and Jon Kyle(R-AZ)
Tucson, Arizona	Paul Grijaval (D-07)	John McCain (R-AZ) and Jon Kyle(R-AZ)
Edwards AFB, California	William Thomas (R-22)	Dianne Feinstein (D-CA) and Barbara Boxer (D-CA)
Torrance, California	Jane Harman (D-36)	Dianne Feinstein (D-CA) and Barbara Boxer (D-CA)
Vandenburg AFB, California	Lois Capps (D-23)	Dianne Feinstein (D-CA) and Barbara Boxer (D-CA)
Aurora/Denver, Colorado	Diana DeGette (D-01)	Ben Campbell (R-CO) and Wayne Allard (R-CO)
Colorado Springs, Colorado	Scott McInnis (R-03)	Ben Campbell (R-CO) and Wayne Allard (R-CO)
Pueblo, Colorado	Joel Hefley (R-05)	Ben Campbell (R-CO) and Wayne Allard (R-CO)
Schriever AFB, Colorado	Joel Hefley (R-05)	Ben Campbell (R-CO) and Wayne Allard (R-CO)
Eglin AFB, Florida	Ginny Brown-Waite (R-05)	Bob Graham (D-FL) and Bill Nelson (D-FL)
Fort Walton Beach, Florida	Jeff Miller (R-01)	Bob Graham (D-FL) and Bill Nelson (D-FL)
Kennedy Space Center, Florida	Tom Feeney (R-24)	Bob Graham (D-FL) and Bill Nelson (D-FL)
Cape Canaveral, Florida	Dave Weldon (R-15)	Bob Graham (D-FL) and Bill Nelson (D-FL)
Honolulu, Hawaii	Neil Abercrombie (D-01)	Daniel Inouye (D-HI) and Daniel Akaka (D-HI)
Kihei, Hawaii	Ed Case (D-02)	Daniel Inouye (D-HI) and Daniel Akaka (D-HI)
Chicago, Illinois	Luis Guterrez (D-04)	Richard Durbin (D-IL) and Peter Fitzgerald (R-IL)
FT Knox, Kentucky	Ron Lewis (R-02)	Mitch McConnell (R-KY) and Jim Bunning (R-KY)
Andrews AFB, Maryland	Albert Wynn (D-04)	Paul Sarbanes (D-MD) Barabara Mikulski (D-MD)
Columbia, Maryland	Elijah Cummings (D-07)	Paul Sarbanes (D-MD) Barabara Mikulski (D-MD)
Sea Brook, Maryland	Steny Hoyer (D-05)	Paul Sarbanes (D-MD) Barabara Mikulski (D-MD)
Grand Rapids, Michigan	Vernon Ehlers (D-03)	Carl Levin (D-MI) and Debbie Stabenow (D-MI)
Stennis Space Center, Mississippi	Gene Taylor (D-04)	Thad Cochran (R-MS) and Trent Lott (R-MS)

St Charles, Missouri	Todd Akin (R-02)	Christopher Bond (R-MO) and Jim Talent (R-MO)
St Louis, Missouri	William Clay Jr. (D-01)	Christopher Bond (R-MO) and Jim Talent (R-MO)
Offutt AFB, Nebraska	Lee Terry (R-02)	Chuck Hagel (R-NE) and Ben Nelson (D-NE)
Fort Monmouth, New Jersey	Frank Pallone (D-06)	Jon Corzine (D-NJ) and Frank Lautenberg (D-NJ)
McGuire AFB, New Jersey	Jim Saxton (R-03)	Jon Corzine (D-NJ) and Frank Lautenberg (D-NJ)
Albuquerque, New Mexico	Heather Wilson (R-01)	Pete Domenici (R-NM) and Jeff Bingaman (D-NM)
Long Island, New York	Timothy Bishop (D-01)	H.R. Clinton (D-NY) and Charles Schumer (D-NY)
Altus AFB, Oklahoma	Frank Lucas (R-03)	Don Nickles (R-OK) and James Inhofe (R-OK)
Midwest City, Oklahoma	<b>Earnest Istook (R-05)</b>	Don Nickles (R-OK) and James Inhofe (R-OK)
Tinker AFB, Oklahoma	Ernest Istook (R-05)	Don Nickles (R-OK) and James Inhofe (R-OK)
Tulsa, Oklahoma	Frank Lucas (R-03)	Don Nickles (R-OK) and James Inhofe (R-OK)
Newtown Square, Pennsylvania	Curt Weldon (R-07)	Arlen Specter (R-PA) and Rick Santorum (R-PA)
Ridley Park, Pennsylvania	Robert Brady D-01)	Arlen Specter (R-PA) and Rick Santorum (R-PA)
Amarillo/Lubbock, Texas	Randy Neugebauer (R-19)	Kay Hutchinson (R-TX) and John Cornyn (R-TX)
Corpus Christi, Texas	Solomon Ortiz (D-27)	Kay Hutchinson (R-TX) and John Cornyn (R-TX)
Dallas, Texas	Eddie Johnson (D-30)	Kay Hutchinson (R-TX) and John Cornyn (R-TX)
Ft Hood, Texas	Chet Edwards (D-11)	Kay Hutchinson (R-TX) and John Cornyn (R-TX)
Richardson, Texas	Sam Johnson (R-03)	Kay Hutchinson (R-TX) and John Cornyn (R-TX)
Clearfield, Utah	Rob Bishop (R-01)	Orin Hatch (R-UT) and Robert Barrett (R-UT)
Layton, Utah	<b>Rob Bishop (R-01)</b>	Orin Hatch (R-UT) and Robert Barrett (R-UT)
Salt Lake City, Utah	<b>Rob Bishop (R-01)</b>	Orin Hatch (R-UT) and Robert Barrett (R-UT)
Arlington, Virginia	James Moran D-08)	John Warner (R-VA) and George Allen (R-VA)
Chantilly, Virginia	<b>Frank Wolf (R-10)</b>	John Warner (R-VA) and George Allen (R-VA)
Herndon, Virginia	Frank Wolf (R-10)	John Warner (R-VA) and George Allen (R-VA)
Ft. Eustis, Virginia	<b>Robert Scott (D-03)</b>	John Warner (R-VA) and George Allen (R-VA)
Langley AFB, Virginia	Robert Scott (D-03)	John Warner (R-VA) and George Allen (R-VA)
Leesburg, Virginia	<b>Frank Wolf (R-10)</b>	John Warner (R-VA) and George Allen (R-VA)

Springfield, Virginia	James Moran D-08)	John Warner (R-VA) and George Allen (R-VA)
Tukwila, Washington	Adam Smith (D-09)	Patty Murry (D-WA) and Maria Cantwell (D-WA)

#### Total Representatives of Boeing Commercial Aircraft Division

Reps	16	
Senators	12	Washington, Tennessee, Kansas, California, Pennsylvania, Texas

#### Total Boeing Representatives

States	25
Reps	60
Senators	50

	Represents multiple business lines (not counted more than once in either totals)
	Represents multiple activities (not counted more than once in the header)

This table was built by examining the production and business locations of the Boeing Company. Using the addresses of these Boeing locations a search for the Congressional representatives was conducted using “Contacting the Congress, On Line Directory for the 108<sup>th</sup> Congress” at <http://www.visi.com/juan/congress/>.

## APPENDIX 2 TO CHAPTER IV: 2004 BOEING COMPANY CAMPAIGN CONTRIBUTIONS

### House Candidates

Candidate	Amount of Contribution	Candidate	Amount of Contribution
Abercrombie, Neil (D-HI)	\$ 2,000.00	Aderhold, Robert B. (R-AL)	\$ 2,000.00
Akin, Todd (R-MO)	\$ 6,000.00	Ballard, Brian (D-WA)	\$ 3,000.00
Ballenger, Cass (R-NC)	\$ 1,000.00	Beauprez, Bob (R-CO)	\$ 1,000.00
Bell, Chris (D-TX)	\$ 1,000.00	Bereuter, Doug (R-NE)	\$ 2,000.00
Berman, Howard L (D-CA)	\$ 1,000.00	Bishop, Rob (R-UT)	\$ 500.00
Bishop, Sanford D. Jr (D-GA)	\$ 1,000.00	Blummenauer, Earl (D-OR)	\$ 1,500.00
Blunt, Roy (R-MO)	\$ 5,000.00	Boehlert, Sherwood (R-NY)	\$ 5,500.00
Bonilla, Henry (R-TX)	\$ 5,000.00	Bonner, Jo (R-AL)	\$ 2,000.00
Boswell, Leonard L. (D-IA)	\$ 1,000.00	Brady, Robert A. (D-PA)	\$ 1,000.00
Clavert, Ken (R-CA)	\$ 4,000.00	Cantor, Eric (R-VA)	\$ 2,000.00
Cardin, Ben (D-MD)	\$ 1,000.00	Clay, William L JR	\$ 1,000.00
Cole, Tom (R-OK)	\$ 1,000.00	Cox, Christopher (R-CA)	\$ 2,500.00
Cramer, Bud (D-AL)	\$ 2,000.00	Crane, Phil (R-IL)	\$ 6,000.00
Crenshaw, Ander (R-FL)	\$ 1,000.00	Cunnninham, Randy "Duke" (R-CA)	\$ 3,000.00
Davis, Jim (D-FL)	\$ 1,000.00	Davis Tom (R-VA)	\$ 1,000.00
DeLay, Tom (R-TX)	\$ 4,000.00	Dicks, Nrm (D-WA)	\$ 10,000.00
Dreier, David (R-CA)	\$ 2,000.00	Duncan, Jennifer (R-WA)	\$ 8,000.00
Edwards, Chet (D-TX)	\$ 4,000.00	Emanuel, Rahm (D-IL)	\$ 1,000.00
Emerson, Jo Ann (R-MO)	\$ 5,000.00	Etheridge, Bob (D-NC)	\$ 1,000.00
Everett, Terry (R-AL)	\$ 3,500.00	Feeney, Tom (R-FL)	\$ 3,000.00
Forbes, J Randy (R-VA)	\$ 1,000.00	Franks, Trent (R-AZ)	\$ 1,000.00
Frelinghuysen, Rodney (R-NJ)	\$ 1,000.00	Frost, Martin (D-TX)	\$ 5,000.00
Gallegly, Elton (R-CA)	\$ 1,000.00	Gibbons, Jim (R-NV)	\$ 2,000.00
Gingrey, Phil (R-GA)	\$ 250.00	Gordon, Bart (D-TN)	\$ 1,000.00
Granger, Kay (R-TX)	\$ 1,000.00	Graves, Sam (R-MO)	\$ 1,000.00
Hall, Ralph M (R-TX)	\$ 2,000.00	Harman, Jane (D-CA)	\$ 10,000.00
Hastert, Dennis (R-IL)	\$ 6,000.00	Hastings, Doc (R-WA)	\$ 3,000.00
Hayes, Robin (R-NC)	\$ 3,000.00	Hayworth, JD (R-AZ)	\$ 2,580.00
Hobson, Dave (R-OH)	\$ 3,000.00	Hoekstra, Peter (R-MI)	\$ 2,000.00
Houghton, Aml (R-NY)	\$ 1,000.00	Hoyer, Steny H (D-MD)	\$ 5,000.00
Hulshof, Kenny (R-MO)	\$ 5,000.00	Hunter, Duncan (R-CA)	\$ 5,000.00
Hyde, Henry J. (R-IL)	\$ 2,000.00	Inslee, Jay R (D-WA)	\$ 2,500.00
Issa, Darrell (R-CA)	\$ 2,000.00	Istook, Earnest J. (R-OK)	\$ 3,000.00
Jefferson, William J (D-LA)	\$ 2,000.00	Johnston, Eddie (D-TX)	\$ 1,500.00
Johnston, Nancy L (R-CT)	\$ 4,000.00	Johnston, Sam (R-TX)	\$ 1,000.00
Jones, Walter B Jr (R-NC)	\$ -	Karr, Alice Forgey (R-KY)	\$ 1,000.00
Kingston, Jack (R-GA)	\$ 1,000.00	Kirk, Mark (R-IL)	\$ 2,000.00
Knollenberg, Joe (R-MI)	\$ 1,000.00	Kolbe, June (R-AZ)	\$ 2,000.00
LaHood, Ray (r-IL)	\$ 1,000.00	Lampson, Nick (D-TX)	\$ 2,000.00

Larsen, Rick (D-WA)	\$ 5,000.00	Larson, John B (D-CT)	\$ 1,000.00
Levin, Sander (D-MI)	\$ 2,000.00	Lewis, Jerry (R-CA)	\$ 8,000.00
Manzullo, Don (R-IL)	\$ 5,000.00	Matheson, Jim (D-UT)	\$ 1,000.00
Matsui, Robert T (D-CA)	\$ 4,000.00	MacCrary, Jim (R-LA)	\$ 1,000.00
McDermott, Jim (D-WA)	\$ 1,500.00	McKeon, Howard P (R-CA)	\$ 2,500.00
Mica, John L (R-FL)	\$ 5,000.00	Millender-McDonald, J (D-CA)	\$ 3,000.00
Moore, Dennis (D-KS)	\$ 3,000.00	Moran, Jerry (R-KS)	\$ 3,000.00
Moran, Jim (D-VA)	\$ 2,000.00	Murtha, John P (D-PA)	\$ 5,000.00
Northup, Anne (R-KY)	\$ 1,000.00	Nussle, Jim (R-IA)	\$ 2,000.00
Oberstar, James L (D-MN)	\$ 1,000.00	Obey, David R. (D-WI)	\$ 2,000.00
Pastor, Ed (D-AZ)	\$ 500.00	Pelosi, Nancy (D-CA)	\$ 2,000.00
Pickering, Charels Jr (R-MS)	\$ 1,000.00	Pryce, Deborah (R-OH)	\$ 1,000.00
Quigley, Lisa (D-CA)	\$ 1,000.00	Quinn, Jack (R-NY)	\$ 500.00
Rangel, Charels B (D-NY)	\$ 4,000.00	Rayes, Silvestre (D-TX)	\$ 6,000.00
Reynolds, Tom (R-NY)	\$ 2,000.00	Rodriguez, Ciro (D-TX)	\$ 3,000.00
Rogers, Hal (R-KY)	\$ 2,000.00	Rogers, Mike (R-AL)	\$ 500.00
Rohrabacher, Dana (R-CA)	\$ 2,000.00	Royce, Ed (R-CA)	\$ 1,000.00
Ruppersberger, Dutch (D-MD)	\$ 2,500.00	Rush, Bobby (D-IL)	\$ 1,000.00
Ryun, Jim (R-KS)	\$ 6,000.00	Sabo, Martin (D-MN)	\$ 1,000.00
Sanchez, Loretta (D-CA)	\$ 3,000.00	Sandlin, Max (D-TX)	\$ 2,000.00
Saxton, Jim (R-NJ)	\$ 3,000.00	Schrock, Ed (R-VA)	\$ 2,000.00
Sessions, Pete (R-TX)	\$ 2,000.00	Shaw, E Jr (R-FL)	\$ 1,000.00
Sherwood, Dawn (R-PA)	\$ 1,000.00	Shimkus, John M (R-IL)	\$ 1,000.00
Simmons, Rob (R-CT)	\$ 1,000.00	Skelton, Ike (D-MO)	\$ 10,000.00
Simth, Adam (D-WA)	\$ 4,000.00	Smith, Lamar (R-TX)	\$ 1,000.00
Spratt, John M Jr (D-SC)	\$ 2,000.00	Stenholm, Charles W (D-TX)	\$ 2,000.00
Tauscher, Ellem (D-CA)	\$ 3,500.00	Taylor, Gene (D-MS)	\$ 2,000.00
Thomas, Bill (R-CA)	\$ 2,500.00	Tiahert, Todd (R-KS)	\$ 10,000.00
Turner, Jim (D-TX)	\$ 2,000.00	Turner, Michael (R-OH)	\$ 1,000.00
Walsh, James T. (R-NY)	\$ 4,000.00	Weldon, Curt (R-PA)	\$ 5,000.00
Weldon, Dave (R-FL)	\$ 3,000.00	Willer, Jerry (R-IL)	\$ 2,000.00
Wicker, Roger (R-MS)	\$ 1,000.00	Wilson, Heather (R-NM)	\$ 4,000.00
Wilson, Joe (R-SC)	\$ 500.00	Wu, David (D-OR)	\$ 1,000.00
Young, CW Bill (R-FL)	\$ 2,000.00	Young, Don (R-AK)	\$ 4,000.00
<b>Total to Democratic Candidates</b>	<b>\$ 146,000.00</b>	<b>Total to Republican Candidates</b>	<b>\$ 231,330.00</b>

#### Senate Candidates

Candidate	Amount of Contribution	Candidate	Amount of Contribution
Bayh, Evan (D-IN)	\$ 4,000.00	Bennett, Robert F (R-UT)	\$ 2,000.00
Bond, Christopher (R-MO)	\$ 10,000.00	Boxer, Barbara (D-CA)	\$ 3,000.00
Breaux, John (D-LA)	\$ 3,000.00	Brownback, Sam (R-KS)	\$ 10,000.00
Bunning, Jim (R-KY)	\$ 2,000.00	Campbell, Ben (R-CO)	\$ 3,000.00
Carson, Brad (D-OK)	\$ 1,000.00	Chambliss, Saxby (R-GA)	\$ 2,000.00
Conrad, Kent (D-ND)	\$ 3,500.00	Coryn, John (R-TX)	\$ 1,000.00
Daschle, Tom (D-SD)	\$ 5,000.00	DeWinne, Mike (R-OH)	\$ 2,000.00

Dodd, Chris (D-CT)	\$ 2,000.00	Dorgan, Byron (D-ND)	\$ 6,000.00
Feinstien, Dianne (D-CA)	\$ 9,000.00	Grassley, Chuck (R-IA)	\$ 6,000.00
Gregg, Judd (R-NH)	\$ 1,000.00	Hagel, Chuck (R-NE)	\$ -
Hollings, Fritz (D-SC)	\$ 1,000.00	Inouye, Daniel (D-HI)	\$ 1,500.00
Levin, Carl (D-MI)	\$ -	Lincoln, Blanche (D-AR)	\$ 3,000.00
Mikulski, Barbara (D-MD)	\$ 5,500.00	Murkowski, Lisa (R-AK )	\$ 5,000.00
Nelson, Bill (D-FL)	\$ 2,000.00	Nethercutt, George R Jr (R-WA)	\$ 3,000.00
Nickles, Don (R-OK)	\$ 3,000.00	Reid, Harry (D-NV)	\$ 3,000.00
Shelby, Richard (R-AL)	\$ 7,000.00	Specter, Arlen, (R-PA)	\$ 5,000.00
Vitter, David (R-LA)	\$ 2,000.00	Wyden, Ron (D-OR)	\$ 2,000.00
Total to Democratic Candidates	\$ 53,500.00	Total to Republican Candidates	\$ 63,000.00

#### Presidential Candidates

Candidate	Amount of Contribution
Bush, George W (R )	\$ 5,000.00

This table was built by modifying The Boeing Company PAC Contributions to Federal Candidates 2004 Cycle listing. This PAC contribution is based on data released by the FEC on Monday, March 29, 2004.

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## LIST OF ACRONYMS AND ABBREVIATIONS

ACAT	Acquisition Category
ADM	Acquisition Decision Memorandum
AWACS	Airborne Early Warning and Control System
AMC	Air Mobility Command
AoA	Analysis of Alternatives
BA	Budget Authorization
DADTA	Durability and Damage Tolerance Assessment
DPG	Defense Planning Guidance
DoD	Department of Defense
DoDAA	Department of Defense Appropriations Act
DOTMLPF	Doctrine, Organization, Training, Material, Leadership, Personnel, and Facilities
CBO	Congressional Budgeting Office
CDD	Capability Development Document
CEO	Chief Executive Officer
CFO	Chief Financial Officer
CJCS	Chairman, Joint Chiefs of Staff
CoS	Chief of Staff
COCOM	Combatant Commanders
CR	Concept Refinement
CRS	Congressional Research Service
EADS	European Aeronautic Defence and Space Company
ESLS	Economic Service Life Study
FAA	Federal Aviation Administration
FSTA	Future Strategic Tanker Aircraft
FRP	Full-Rate Production
FY	Fiscal Year
FYDP	Future Years Defense Plan
GAO	Government Accounting Office
GATM	Global Air Traffic Management
GPS	Global Positioning System
HASC	House Armed Services Committee
ICD	Initial Capabilities Document
IG	Inspector General
JCIDS	Joint Capabilities Integration and Development System
JROC	Joint Requirements Oversight Council
KPP	Key Performance Parameters
Lt. Col. or LTC	Lieutenant Colonel
LRIP	Low-Rate Initial Production
MC2A	Multi-Sensor Command and Control Aircraft
MCR	Mission Capable Rate

MDA	Milestone Decision Authority
MOD	Ministry of Defence
MYP	Multi-year Procurement
NDI	Non-Developmental Item
NMS	National Military Strategy
NSS	National Security Strategy
OIF	Operation Iraqi Freedom
ORD	Operational Requirements Document
OMB	Office of Management and Budget
PD	Production Demonstration
PDM	Programmed (Program) Depot Maintenance
	Program Decision Memorandum
PFI	Private Finance Initiative
	Private Funding Initiative
PL	Public Law
PM	Program Managers
POGO	Project on Government Oversight
POM	Program Objective Memorandum
QDR	Quadrennial Defense Review
POTUS	President of the United States
RAF	Royal Air Force
RARO	Remote Aerial Refueling Operation
RCM	Requirements Correlation Matrix
RDT&E	Research, Development, Testing & Evaluation
RVSM	Reduced Vertical Separation Minima
SASC	Senate Armed Services Committee
SCC	Stress Corrosion Cracking
SDD	System Development and Demonstration
SECDEF	Secretary of Defense
TD	Technology Development
TDS	Technology Development Strategy
USD(AT&L)	Under Secretary of Defense, Acquisition, Logistics, and Technology
UK	United Kingdom
U.S.	United States
USAF	United States Air Force
VIP	Very Important Person
WARP	Wing Air-Refueling Pods
WFD	Wide-spread Fatigue Damage

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